CFR
3000 and 3000RM

Uninterruptible Power Supplies

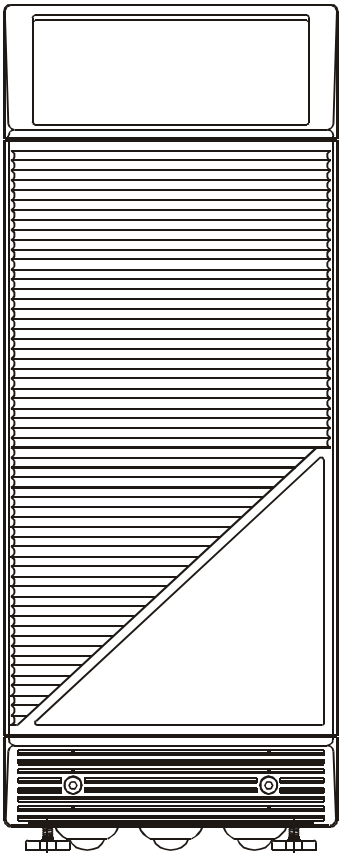
From Alpha Technologies

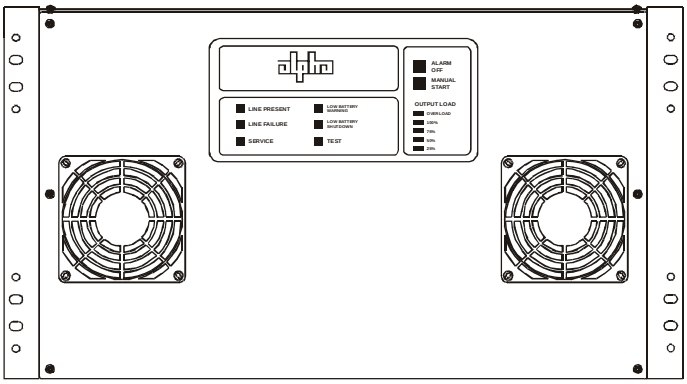
■ Operator's Manual

Operator's Manual

CFR 3000 and 3000RM

Uninterruptible Power Supplies

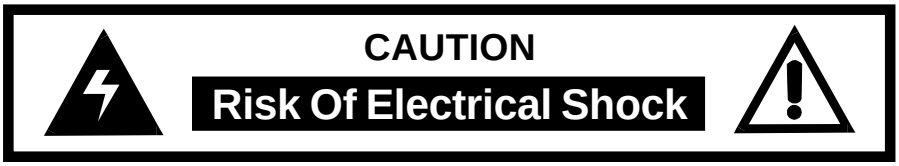




ALPHA TECHNOLOGIES

Save This Manual

It contains important installation and operating instructions.
Keep it in a safe place.



To reduce the risk of electrical shock and to ensure the safe operation of the CFR 3000 and 3000RM, these symbols are used throughout this manual. Where they appear only qualified personnel should carry out the instructions.

A DANGEROUS VOLTAGE exists in this area. Use extreme caution.

ATTENTION: Important operating instructions. Follow them exactly.

NOTICE:
The CFR 3000 and 3000RM generates, uses and can radiate radio frequencies if not installed and tested in accordance with the instructions contained in this manual. It has been tested and found to comply with the limits established for a Class A computing device pursuant to part 15 of FCC rules when it is operated alone. It also complies with the radio interference regulations of DOC which are designed to provide reasonable protection against such interference when this type of equipment is used in a commercial environment. If there is interference to radio or TV reception, which is determined by switching it on and off, relocate the equipment or use an electrical circuit other than the one used by the CFR 3000 and 3000RM.

Safety Checklists

DANGER: Do not expose the unit to rain or moisture.

DANGER: Sealed lead-acid batteries with high energy and chemical hazards are used. This manual contains important operation and safety instructions. Only qualified personnel should service the CFR 3000 and 3000RM.

CFR 3000 and 3000RM Safety Checklist

- ☐ Carefully unpack the unit. Report any shipping damage at once.
- ☐ Read this manual. If you have any questions about the safe installation, operation or maintenance of the unit, contact Alpha Technologies' customer service department.
- ☐ ***Before installation***, confirm the voltage and current input requirements of the load(s) is compatible with the unit's output. Also see the line voltage and current is compatible with the unit's input requirements.
- ☐ The unit should be installed on a dedicated circuit.
- ☐ Wiring should be done to meet local electrical codes.
- ☐ Place a warning label on the electrical panel to tell emergency personnel an Uninterruptible Power Supply (UPS) is installed.
- ☐ Use proper lifting techniques when lifting or moving the unit.
- ☐ The unit has more than one live circuit. AC power may be present at the outputs even if the unit is disconnected from line power.

Battery Safety Checklist

- ☐ Always switch the unit's battery circuit breaker off before connecting or disconnecting an external battery back. This reduces the chance of a spark.
- ☐ There are dangerous voltages inside the unit. Only qualified personnel should perform installation and maintenance.

Safety Checklists (Continued)

- ☐ Live battery wires must not touch the unit's chassis or any other metal objects. ***This can cause a fire or explosion.***
- ☐ Inspect the batteries once a year for signs of cracks, leaks or swelling. Replace as required.
- ☐ When batteries are in storage, charge them at least once every three months for optimum performance and to extend their lifetime.
- ☐ ***Always*** replace batteries with ones of identical type and rating. ***Never*** install old or untested batteries.
- ☐ Use insulated tools during servicing.
- ☐ Remove all rings, watches, jewelry or other conductive items before working inside the enclosure.
- ☐ Follow local regulations for the disposal of batteries. Recycling is the best method.
- ☐ ***Never*** burn batteries to dispose of them. ***They may explode.***
- ☐ ***Do not*** open the batteries. ***The contents are toxic.***

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The emergency shutdown procedure is on the inside rear cover

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Section 1
Introduction

This section introduces you to the Alpha CFR 3000 and 3000RM UPS's:

- **The CFR advantage (Section 1.1).**
- **An unpacking and inspection checklist (Section 1.2).**
- **A tour of the unit, it's connectors, switches and control panels (Section 1.3).**

1.1 The CFR Advantage

■ Advanced Power Protection Technology

Alpha's CFR Uninterruptible Power Supply (UPS) provides continuous and conditioned computer-grade AC power for computer systems, point of sale terminals, process controls, telecommunications, cable TV headend, broadband LAN, manufacturing control systems, hospital critical care and lab equipment.

■ Rack or Tower Mounting

The unit comes in a rack mount case which can be fitted into any standard rack or a tower case for mounting on the floor. The two units operate identically.

■ Regulation

The unit maintains ±1% output regulation without using the batteries. Even with input voltage fluctuations as great as +10% or –20%, the output is constant regardless of the load's size.

■ Isolation

The output is totally isolated from the input to protect the loads from spikes, surges and line noise. The ferro resonant transformer provides nondegradable spike and surge protection.

■ Extended Backup Capability

Alpha's EBP Series external battery packs extends backup time during power outages. Installing the battery pack is as simple as plugging it in.

■ Self Test Function

The built-in self test checks all critical areas, including the batteries, to ensure optimum performance.

■ Load and Overload Information

The display panel shows the loading and tells you when the unit is overloaded.

■ Generator Ready

The unit has frequency sense and constant slew frequency synchronization circuits for trouble-free operation with most standby generators.

■ Advanced Communications Capabilities

The RS–232 communications port is SNMP and modem compatible.

■ Safety

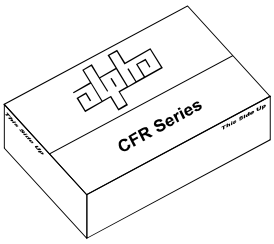
Alpha designed the CFR to meet or exceed the UL, CSA or VDE safety standards. Our commitment to safety makes Alpha Technologies a leader in the power industry.

1.2 Unpacking and Inspection Checklist

TIP: If items are missing or damaged, contact Alpha and the shipping company at once. Most shippers have a short claim period.

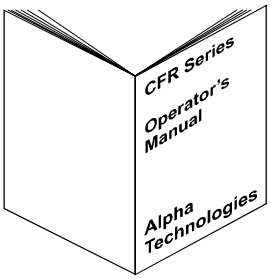
Carefully remove the unit from its shipping container. Inspect it for damage and make sure the following items are included:

- ☐ One CFR series UPS.
- ☐ One operator's manual.
- ☐ Any ordered options.



Save The Original Shipping Container

If you should have to return the unit for servicing, pack it in the original shipping container. Alpha ***is not*** responsible for damage caused by the improper packaging of returned units.



Read This Manual

Before installation, become familiar with your unit by reviewing the procedures and drawings in this manual. If you have any questions about safe installation, operation or maintenance, contact Alpha's customer service department.

Transportation And Site Planning

The weight of the unit and optional battery packs can be as much as several hundred lbs/kg. A safe means of transportation to the site, lifting the cabinet into position and proper floor support must be devised.

1.2 Unpacking and Inspection Checklist (Continued)

Complete the following for your records

Serial # _____

Options _____

Purchase Date _____

This CFR was purchased from

Dealer _____

City _____

State/Province _____

Zip/Postal Code _____

Country _____

Telephone # _____

Fax # _____

E Mail _____

To order parts or for technical information, contact Alpha Technologies customer service department directly at:

United States: (360) 647-2360
Canada: (604) 430-1476
United Kingdom: +44-1279-422110
Germany: +49-9122-79889-0
Middle East: +357-253-75675
Australia: +61-2-9722-3320

For emergency technical support 7 days a week / 24 hours a day call:

USA: 1–800–863–3364

CANADA: 1–800–667–8743

1.3 The Alpha CFR 3000 and 3000RM

1.3.1 Front Panel

TIP: Unless otherwise shown in this manual, the 3000 and 3000RM are identical and operate the same way.

The major difference is the 3000RM does not have internal batteries. An Alpha External Battery Pack (EBP) must be connected (Section 2.4).

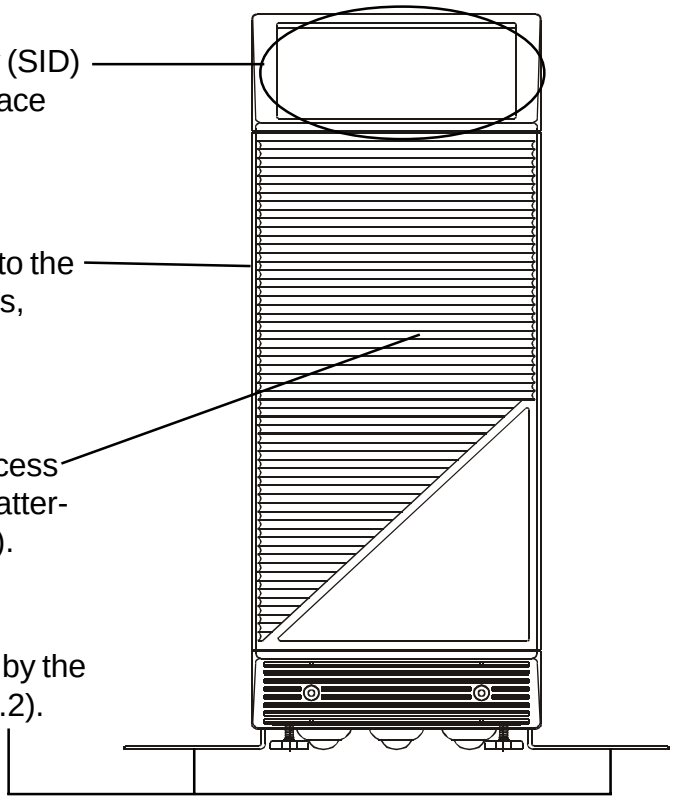
3000 Tower Mount

Display Panel
This is either the Standard Interface Display (SID) (Section 3.5) or the optional Intelligent Interface Device (IID) (manual #018–029–B0–001).

Cover
The cover can be removed to allow access to the unit's interior in order to change the batteries, perform maintenance, etc. (Section 5.4).

Front Panel
The front panel can be removed to allow access to the unit's interior in order to change the batteries, perform maintenance, etc. (Section 5.4).

Seismic Brackets
These secure the unit to the floor if required by the local codes. They are removable (Section 2.2).



Casters
These let you move the unit.

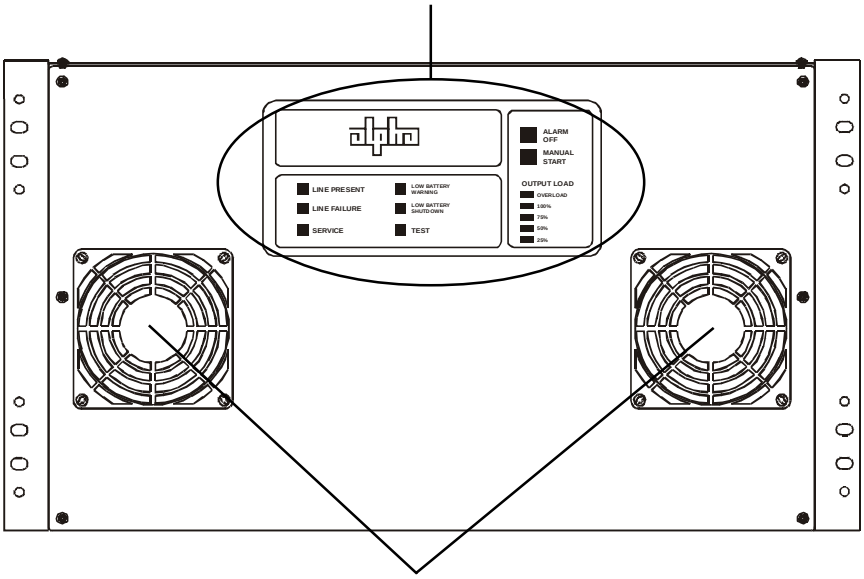
Feet
If you don't secure the unit with the seismic brackets, you can stop the unit from moving by screwing these down.

1.3 The Alpha CFR 3000 and 3000RM (Continued)

3000 Rack Mount (RM)

Display Panel

This is either the Standard Interface Display (SID) (Section 3.5) or the optional Intelligent Interface Device (IID) (manual #018–029–B0–001).



Fans

These two fans cool the unit. They must not be blocked.

1.3 The Alpha CFR 3000 and 3000RM (Continued)

1.3.2 Rear Panel

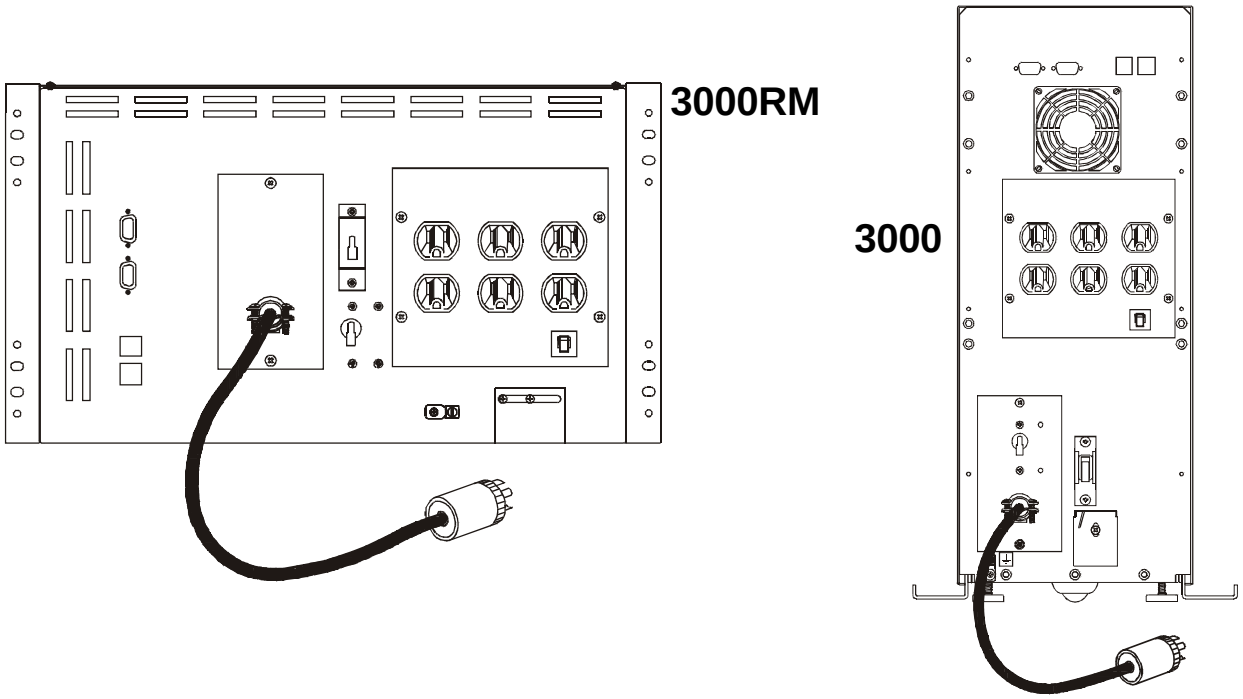
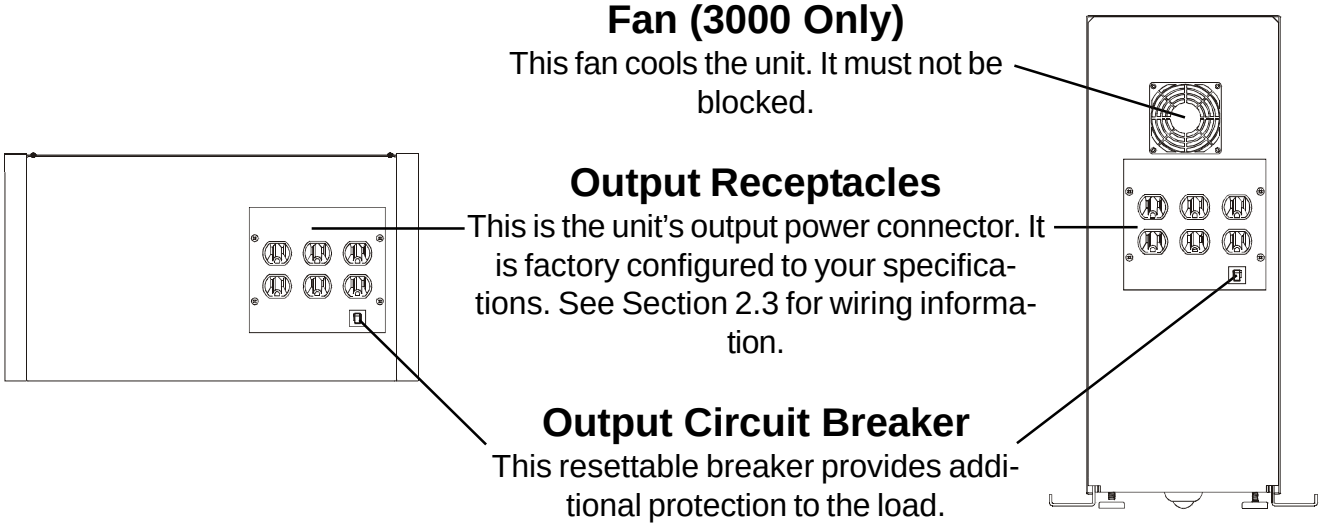
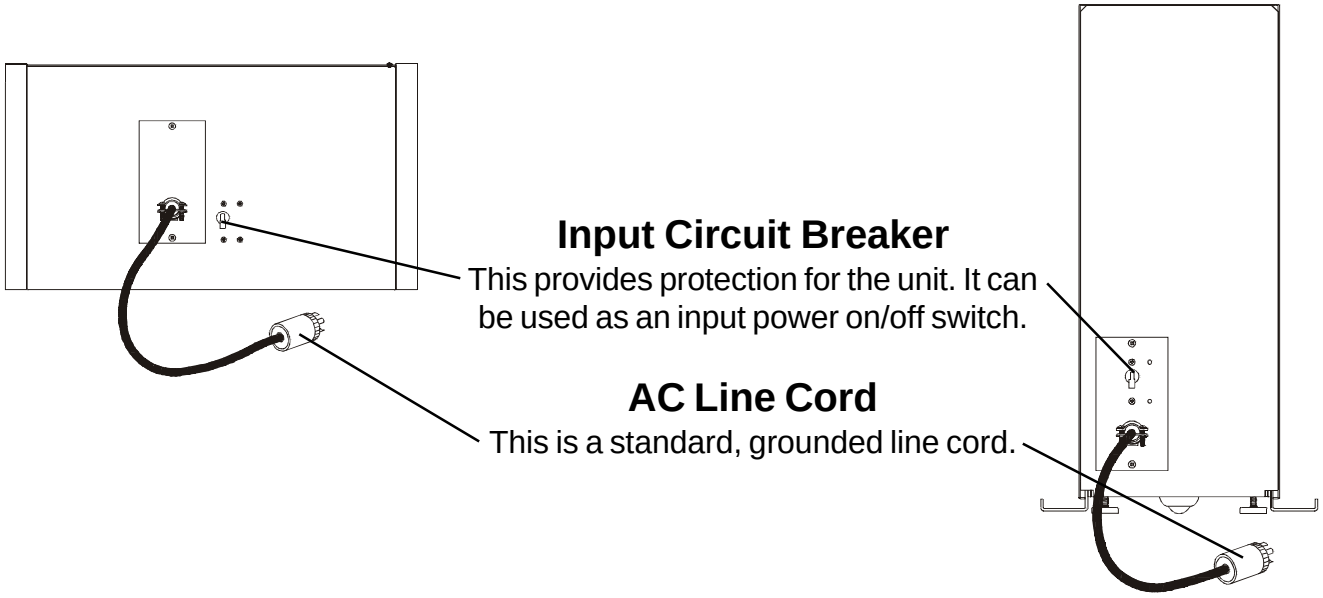


Figure 1.1
Rear Panels


Fan (3000 Only)
This fan cools the unit. It must not be blocked.
Output Receptacles
This is the unit's output power connector. It is factory configured to your specifications. See Section 2.3 for wiring information.
Output Circuit Breaker
This resettable breaker provides additional protection to the load.

1.3 The Alpha CFR 3000 and 3000RM (Continued)



Input Circuit Breaker

This provides protection for the unit. It can be used as an input power on/off switch.

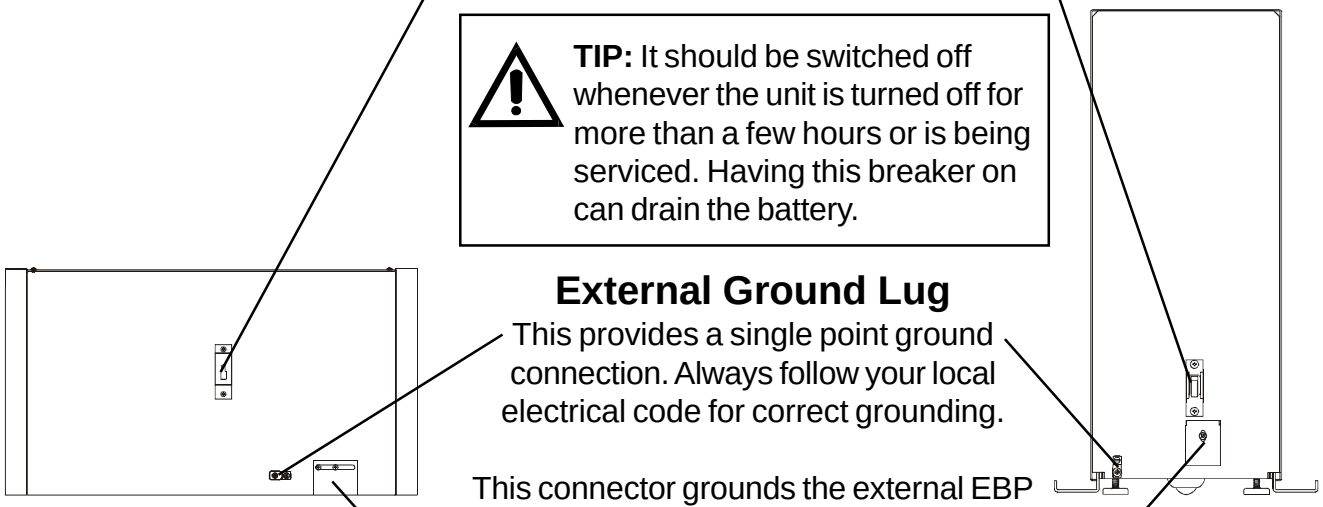
AC Line Cord

This is a standard, grounded line cord.

Battery Circuit Breaker

This protects the unit's inverter and DC circuits and can be used as a battery power on/off switch.

> **TIP:** It should be switched off whenever the unit is turned off for more than a few hours or is being serviced. Having this breaker on can drain the battery.



External Ground Lug

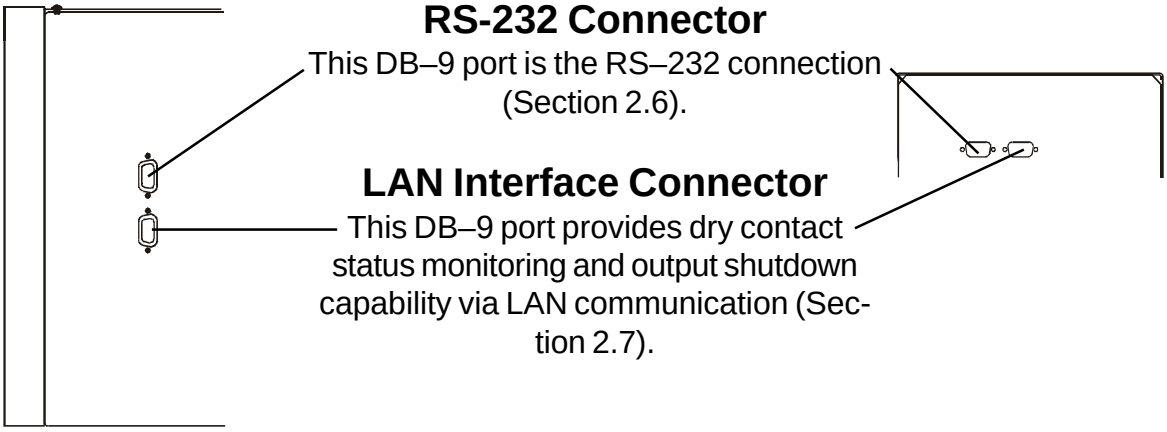
This provides a single point ground connection. Always follow your local electrical code for correct grounding.

This connector grounds the external EBP battery packs to the unit.

External Battery Connector

It accepts a standard plug from either Alpha's EBP series battery pack or a custom battery source (Section 2.4).

1.3 The Alpha CFR 3000 and 3000RM (Continued)

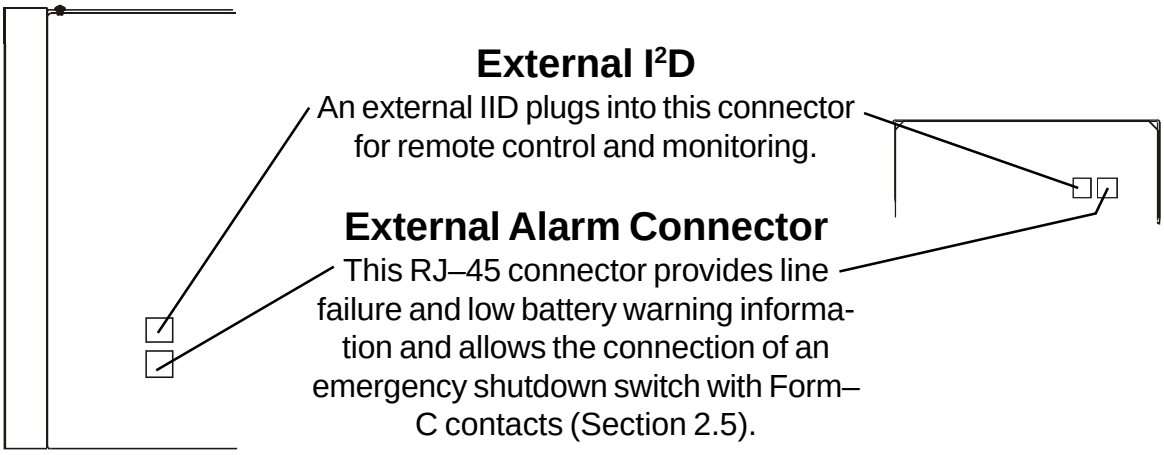


RS-232 Connector

This DB–9 port is the RS–232 connection (Section 2.6).

LAN Interface Connector

This DB–9 port provides dry contact status monitoring and output shutdown capability via LAN communication (Section 2.7).



External I^2D

An external IID plugs into this connector for remote control and monitoring.

External Alarm Connector

This RJ–45 connector provides line failure and low battery warning information and allows the connection of an emergency shutdown switch with Form–C contacts (Section 2.5).

Section 2
Installation

This section shows you how to install and connect the Alpha CFR 3000 and 3000RM UPS's:

- **A pre-installation checklist (Section 2.1).**
- **How to unpack and install the unit (Section 2.2).**
- **How to connect the unit to the loads, the batteries and the line (Section 2.3).**
- **How to connect the external battery packs (Section 2.4).**
- **How to connect the external alarm port (Section 2.5).**
- **How to connect the RS–232 communications port (Section 2.6)**
- **How to connect the LAN port (Section 2.7).**
- **How to prevent the UPS from being overloaded (Section 2.8)**

2.1 Pre–Installation Checklist

2.1.1 Site Preparation

☐ Install the unit upright in a dry, well-ventilated, dust free environment. There must be at least 6 inches (152 mm) between the unit and the wall(s) for cooling and access to the front and rear panels. Do not place the unit next to air conditioning or heating thermostats.

☐ Do not connect the unit to line conditioning equipment. This can cause improper operation of both the unit and the equipment.

☐ Do not connect equipment that produces electrical noise such as motors, relay control circuits, copiers or laser printers to the same circuit as quieter or more sensitive devices. The unit cannot fully protect this type of equipment when noisy devices are connected. Electrically noisy equipment should be connected to a dedicated unit.

☐ Place a warning label on the electrical panel so emergency personnel know a UPS is in the building. Label the service panel(s) to identify the circuit(s) supplying and being supplied by the unit.

2.1.2 Grounding & Utility Line

☐ All wiring should be done only by qualified personnel and comply with the local electrical code.

☐ The unit's input and output voltage is factory configured to your specifications. If you need to change either one or both, see Section 5.5, "Configuring the Input/Output Voltage."

☐ If required, install a hardwired ground. Since many older facilities have improper grounding, a qualified electrician should inspect both the wiring and the grounding before installation.

☐ Measure the line voltage at the main electrical panel. Compare that reading with the input rating of the unit as listed on the nameplate label on the back panel:

- **240 VAC units**: the voltage must be between 216 VAC and 252 VAC.
- **230 VAC units**: the voltage must be between 207 VAC and 242 VAC.
- **208 VAC units**: the voltage must be between 188 VAC and 216 VAC.
- **120 VAC units**: the voltage must be between 110 VAC and 125 VAC.

Also see Section 2.8, "Transformer Output Load Sharing." For information about reconfiguring the unit's input or output voltage , see Section 5.5, "Configuring the Input/ Output Voltage."

2.1 Pre–Installation Checklist (Continued)

☐ The unit should be wired to dedicated circuit equipped with a properly sized circuit breaker. The breaker's size is the unit's maximum input current (as given in the specifications) plus 25%.

For example if the unit draws 32.0 Amps of current at 208 VAC, adding 25% the input current becomes 40.0 Amps. A 40 Amp circuit breaker would be OK. Always follow the local electrical code when installing or sizing circuit breakers.

2.1.3 Standby Generator

☐ The unit has frequency sense circuits for operation with most standby generators. Use a generator equipped with electronic speed and voltage controls since the unstable frequencies created by a mechanical governor can make the unit run continuously in line failure mode, draining the batteries.

Before installation see that the generator's output voltage meets the unit's input voltage requirements as shown on both nameplates. A 240 VAC unit must be attached to a 240 VAC generator.

2.2 Installing the Unit

2.2.1: CFR 3000

TIP: The seismic brackets can be removed if they are not required by the local code or you are not in an earthquake zone (See 5).

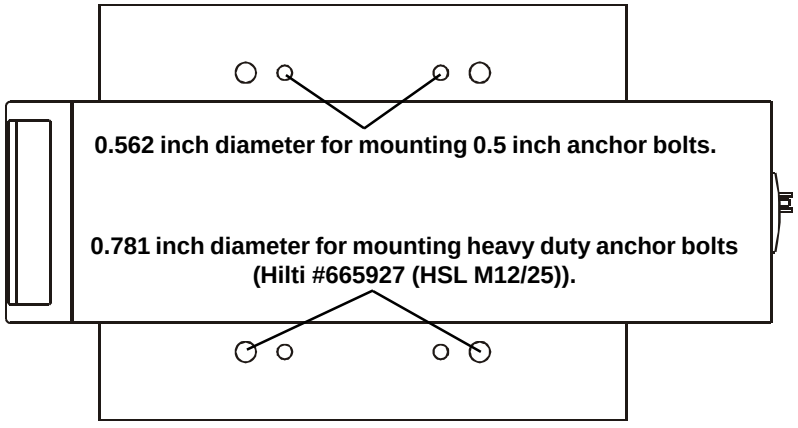
Tools and Materials Required:

- Fork lift or other means of transporting heavy objects (up to 288 lbs./131 kg).
- Screwdriver or power screwdriver with a Philips bit.
- $^{15}/_{16}$ inch socket wrench.

Procedure:

1. The unit is shipped attached to a pallet. Use a forklift to transport the unit and pallet to the installation site.
2. Remove the packing from around the unit. Unbolt the unit from the pallet.
3. Slide the unit off the pallet as per the included instruction sheet (017–098–C3). Move the unit to its final position.
4. If the seismic brackets are used:

   The drawing below looks down unto the brackets and the floor:


0.562 inch diameter for mounting 0.5 inch anchor bolts.
0.781 inch diameter for mounting heavy duty anchor bolts
(Hilti #665927 (HSL M12/25)).

   Mark the position on the floor where the unit will be secured by using the bracket as a template. Drill holes and secure using the appropriate anchor bolts.

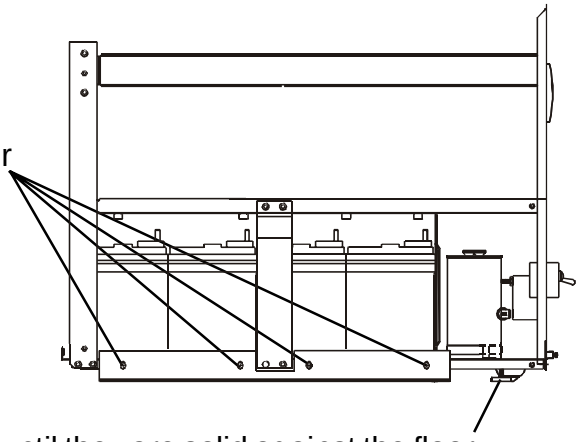
2.2 Installing the Unit (Continued)

5 If the brackets are not needed, remove the cover and the front panel as described in Section 5.4, Step 1, “Remove the Front Panel and the Cover.”

DANGER:
1) There are dangerous voltages inside the unit when the cover is removed.

2) When removing or attaching the cover, do not let it touch the battery terminals, battery wires or other internal components.

6 Remove the seismic brackets by unbolting the four bolts attaching them to the unit.



7 Reattach the cover and the front panel.

8 To stop the unit from moving, screw down the feet until they are solid against the floor.

Installation finished

2.2.2: CFR 3000RM

Tip: The unit is shipped so that it will fit in a 19 inch rack. To fit in a 23 inch rack, reverse the position of the mounting brackets.

Procedure:

1 The unit is shipped attached to a pallet. Use a forklift to transport the unit and pallet to the installation site.

2 Remove the packing from around the unit. Unbolt the unit from the pallet.

3 Move the unit to the rack.

4 Mount it in the rack. The mounting screws are not provided by Alpha. Use the screws specified for your rack.

5 Mount an Alpha external battery pack (Section 2.4).

Installation finished

2.3 Connecting the Unit

2.3.1: Plug and Connector

Danger: All wiring must meet the local electrical code. Mark all circuit breakers supplying power to the unit. Connect a dedicated ground wire to the external ground lug if the building ground is inadequate.

Procedure:

1. Switch off the utility circuit breaker supplying power to the unit.
2. Plug the unit's AC line cord into the receptacle.
3. If used, plug in an external battery pack (Section 2.4).

TIP: The rackmount unit has no internal batteries. It uses an external battery pack.

4. Switch on the utility circuit breaker supplying power to the unit. Start and test the unit with no loads connected (Section 3.3).
   - If it passes go to the next step.
   - If it doesn't do troubleshooting (Sections 3.4, 5.2).
5. Turn off the unit (Section 3.2).
6. Connect the loads. The loads must be turned off before connection.

Connection Finished

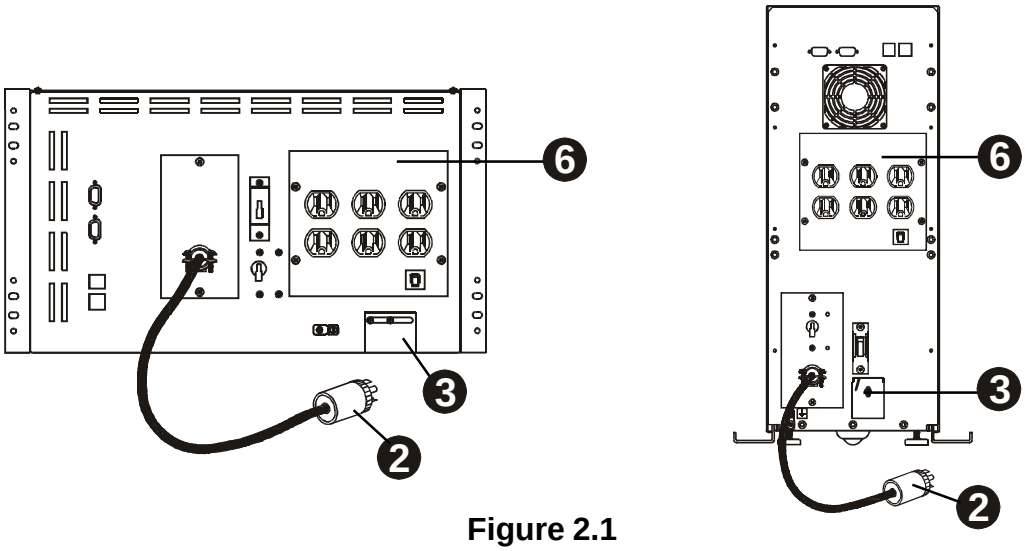


Figure 2.1
Connecting the Unit (Plug and Connector)

2.3 Connecting the Unit (Continued)

2.3.2: Terminal Block

Danger: All wiring must meet the local electrical code. Mark all circuit breakers supplying power to the unit. Connect a dedicated ground wire to the external ground lug if the building ground is inadequate.

Procedure:

1. Switch off the utility circuit breaker supplying power to the unit.

2. Connect the line to the terminal block as given in Figure 2.3.
   - For 120 VAC units use 12 AWG (3.3 mm^2).
   - For 208/230/240 VAC units use 14 AWG (2.0 mm^2).
   - Torque to 35 Inch–Pounds (4.0 Nm).
   - Switch on the utility circuit breaker supplying power to the unit. Make sure the unit has been wired correctly by measuring the voltages at the terminal block. Switch off the circuit breaker.

3. If used, plug in an external battery pack (Section 2.4).

TIP: The rackmount unit has no internal batteries. It uses an external battery pack.

4. Switch on the utility circuit breaker supplying power to the unit. Start and test the unit with no loads connected (Section 3.3).
   - If it passes go to the next step.
   - If it doesn't do troubleshooting (Sections 3.4, 5.2).

5. Switch off the unit (Section 3.2).

6. Connect the loads to the terminal block as shown in Figure 2.4. See 2 for the recommended wire gauges and torques.

Connection Finished

2.3 Connecting the Unit (Continued)

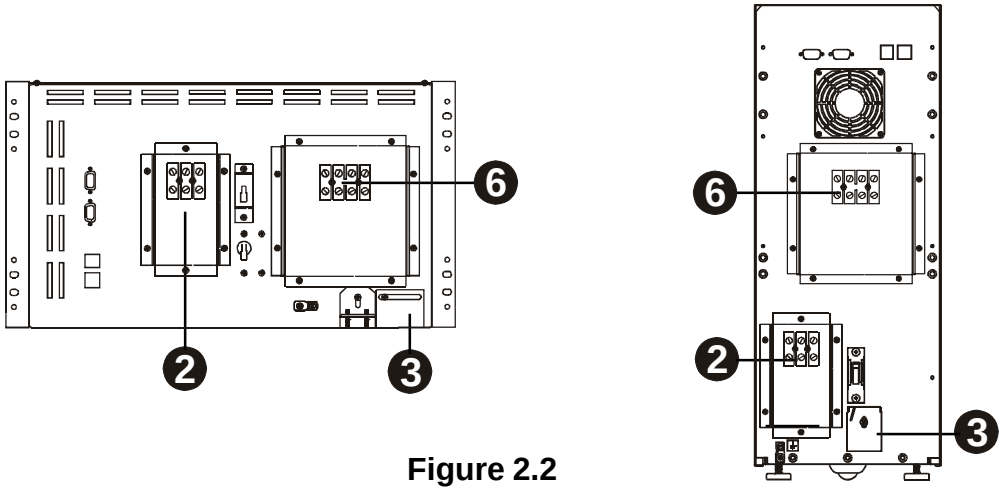


Figure 2.2
Connecting the Unit (Terminal Block)

Frequency	Voltage*		
60 Hz	120 VAC	L	N
	208 VAC	L1	L2
	240 VAC		
50 Hz	230 VAC	L	N

*** Caution:** Refer to the voltage and frequency ratings for the unit as shown on the nameplate.

Figure 2.3
Input Terminal Block Wiring

TIP: Over current protection for the AC output circuit must be provided when the unit is installed.

Frequency	Voltage*			
60 Hz	120/208 VAC	L1	N	L2
	120/240 VAC			
50 Hz	230 VAC	Not Used	N	L

*** Caution:** Refer to the voltage and frequency ratings for the unit as shown on the nameplate.

Figure 2.4
Output Terminal Block Wiring

2.4 Connecting the External Battery Pack

DANGER: There are hazardous voltages inside the battery packs. Use extreme caution. For more information on battery handling, see the safety instructions in the front of this manual.

CAUTION:
1) Verify the pack's polarity and voltage at the connector before attaching the cable to the unit.

2) When a pack or batteries have been in storage for more than 6 months, they should be recharged for at least 24 hours and then thoroughly tested with a load before installation. If after charging, a battery's voltage varies more than 0.3 VDC from the others, do not use it.

Tools and Materials Required:

- DC voltmeter.
- Phillips screwdriver.

Procedure:

1. Verify the battery circuit breaker is switched off. Keep it off until after the unit has been started with line power.
2. Loosen the cover plate and slide it up to expose the connector (Figures 2.5, 2.6).
3. Verify the correct DC voltage and polarity at the battery pack's connector. It should be between 48 to 53 VDC.

TIP: Wrong voltages or polarities could damage the unit or the battery pack.

4. Connect the pack's ground wire to the unit's ground connection.
5. Connect the pack's connector to the unit's battery connector.

Battery Pack Connection Finished

2.4 Connecting the External Battery Pack (Continued)

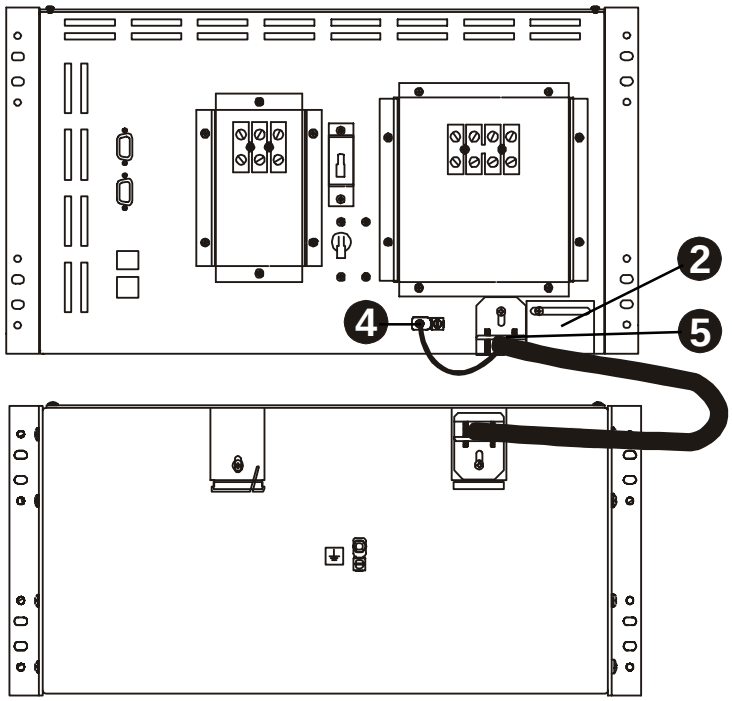


Figure 2.5
Connecting an External Battery Pack to the 3000RM

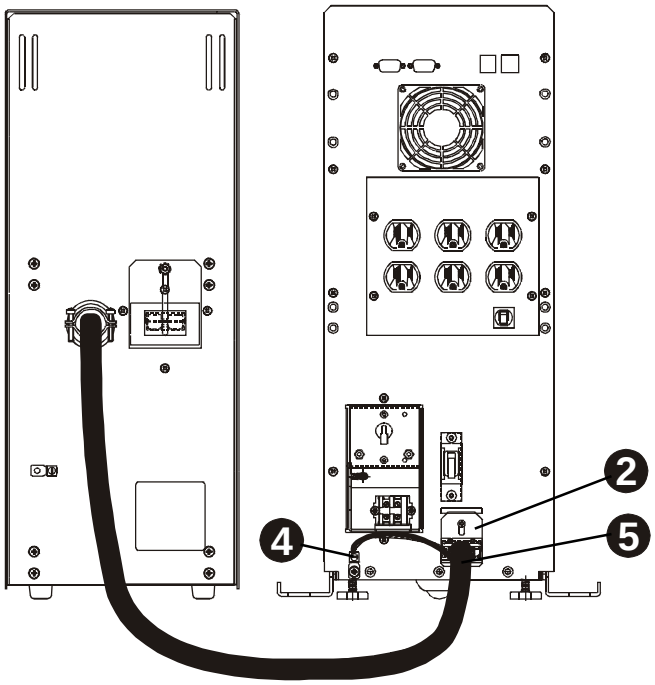


Figure 2.6
Connecting an External Battery Pack to the 3000

2.5 Connecting the External Alarm Port

An external alarm panel can be connected to the external alarm port (Figure 2.7). The port's contacts are rated at 30 VDC at 1 Amp.

An Emergency Power Off (EPO) switch is created by wiring a switch to Pins 7 and 8. This feature must be ordered from the factory so the unit can be configured to operate with this switch.

- The switch must be a SPST, N.O. type and be electrically isolated (up to 1500 VAC isolation is recommended). The connecting cable can be twisted or shielded wire not more than 100 ft. long.
- The contacts must be shorted for at least 1.5 seconds with unit shutdown about 2 seconds after the shorting starts.

CAUTION: The EPO switch does not disconnect the utility line. Switch off the circuit breaker providing line power to the unit.

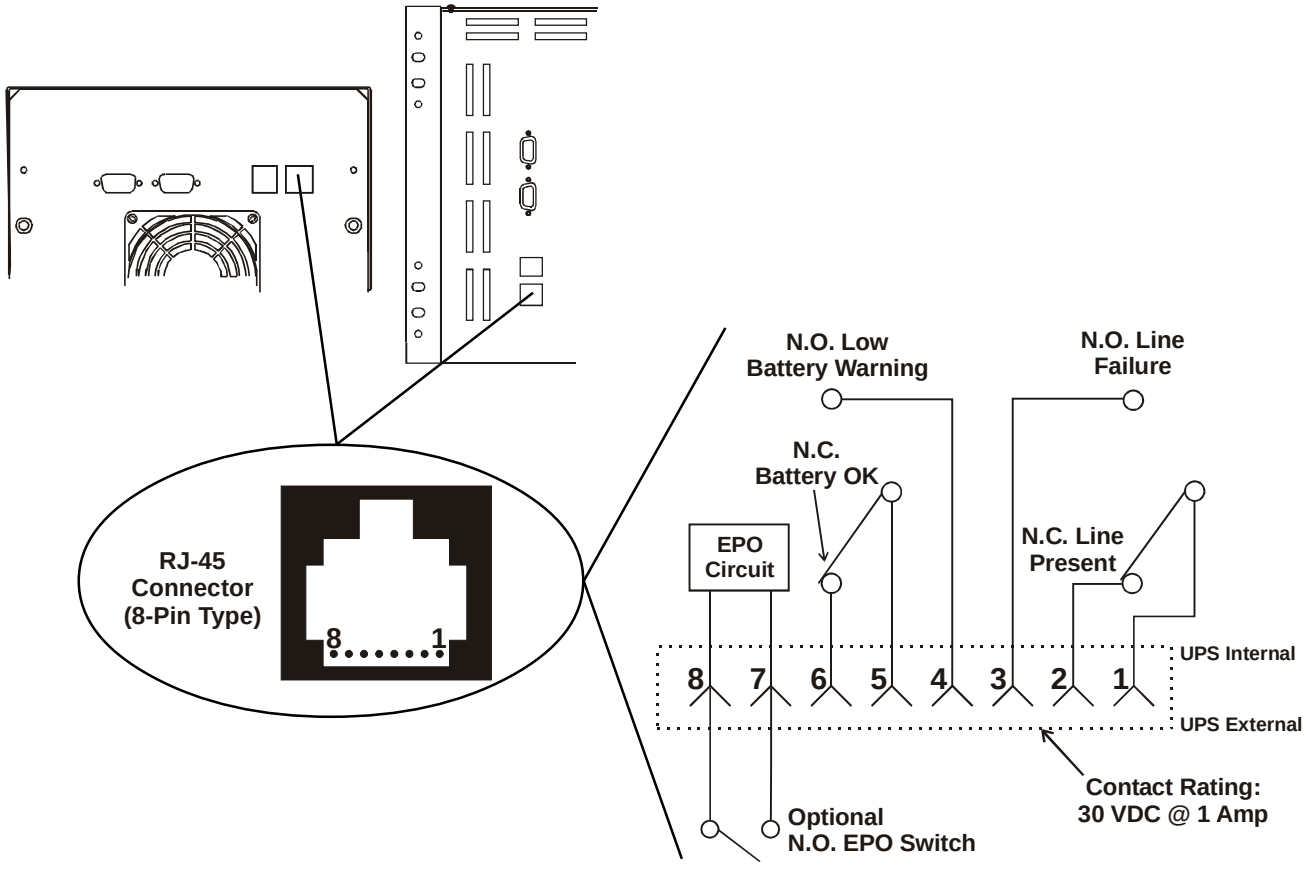


Figure 2.7
Wiring the External Alarm Port

2.6 Connecting the RS–232 Port

The unit can be remotely setup, monitored, and tested by connecting the unit's DB–9 connector to a computer's serial port (Figure 2.8) or communication via a LAN with an optional SNMP agent. Windows HyperTerminal or any other terminal emulation program is used to communicate with the unit. Section 4 gives more information.

The DB–9 port is a standard feature, but its configuration is different depending upon if a SID or IID display panel is installed on the unit.

TIPS:

1) The cable must be less than 50 ft (15m). long and it must be shielded to meet EMI requirements.

2) The RS–232 is not isolated. Signal ground is directly connected to the internal logic ground. Contact Alpha if the external battery connector must be referenced to positive ground instead of negative ground (the factory default).

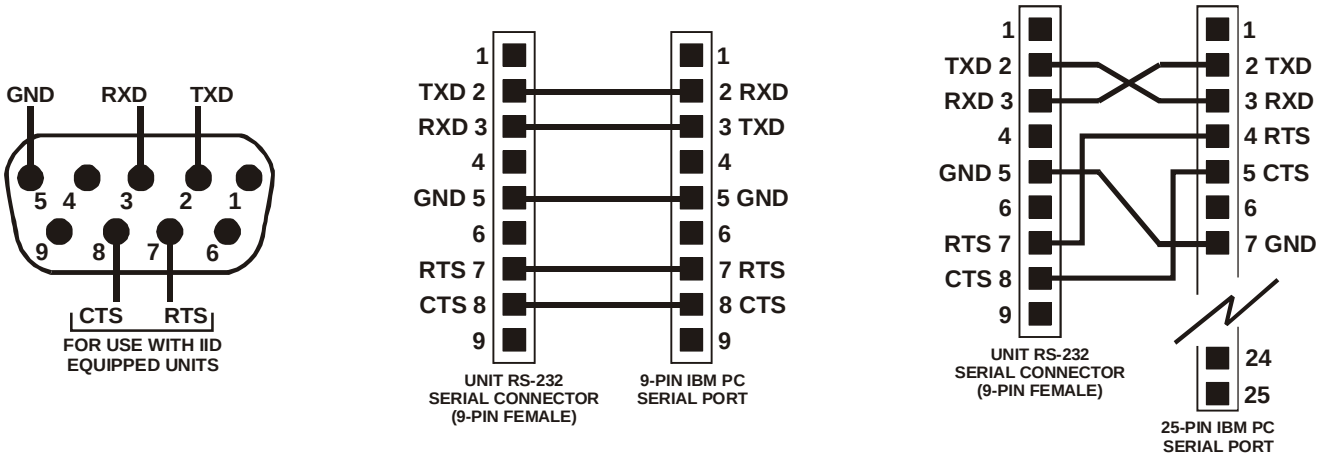

GND
RXD
TXD
5 4 3 2 1
9 8 7 6
CTS
RTS
FOR USE WITH IID EQUIPPED UNITS
1 TXD 2 RXD 3 4 GND 5 6 RTS 7 CTS 8 9
1 2 RXD 3 TXD 4 5 GND 6 7 RTS 8 CTS 9
UNIT RS-232 SERIAL CONNECTOR (9-PIN FEMALE)
9-PIN IBM PC SERIAL PORT
1 TXD 2 RXD 3 4 GND 5 6 RTS 7 CTS 8 9
1 2 TXD 3 RXD 4 RTS 5 CTS 6 7 GND
24 25
UNIT RS-232 SERIAL CONNECTOR (9-PIN FEMALE)
25-PIN IBM PC SERIAL PORT

Figure 2.8
RS–232 Wiring Diagrams

Connecting Units With an SID Display Panel:

- It uses a basic 3–wire line with software handshaking (XON / XOFF).
- Figure 2.8 shows how to connect the RS–232 port to a standard PC serial port.
- The parameters are: 1200 baud, 8 data bits, no parity, 1 stop bit.

Connecting Units With an IID Display Panel:

- The IID RS–232 port uses a nonstandard cable with RTS/CTS signal straight through and RX/TX signals reversed.
- The baud rate is operator-configurable.
- For further information on IID RS–232 applications refer to "Information Management Using the Intelligent Interface Device" manual (Alpha P/N # 018–029–B0–001).

2.7 Connecting the LAN Port

The unit can be remotely monitored and shutdown with the unit's DB–9 LAN port (Figure 2.9).

Two dry contacts provide line failure and low battery information. A connection to the unit's microprocessor shuts down the unit's output. The shutdown delay, duration and recovery is controlled via RS–232 commands (Section 4.5).

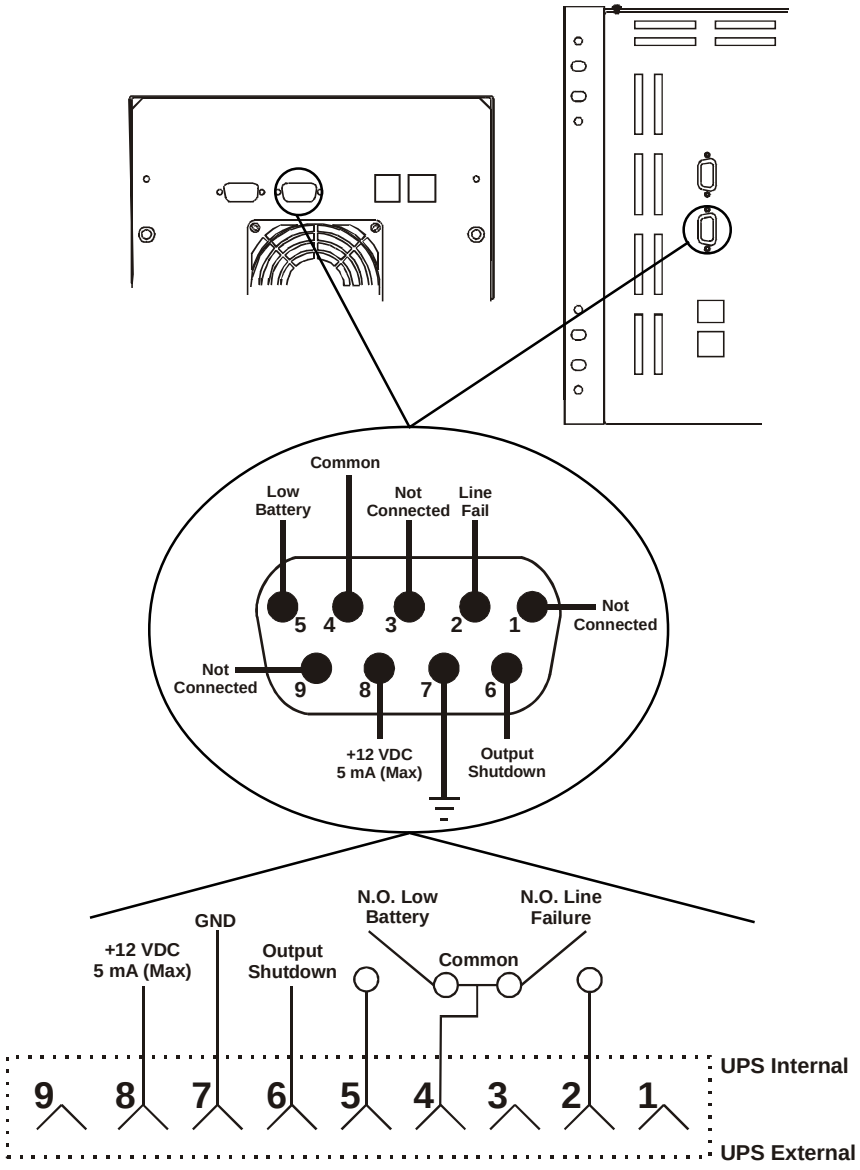


Figure 2.9
Wiring the LAN Port

2.8 Transformer Output Load Sharing

2.8.1: Transformer Output

The units have a single phase output. They do NOT have three phase characteristics.

Figure 2.10 shows the voltages between L1, L2 and N for 120/208/240 units and between L and N for 230 VAC units

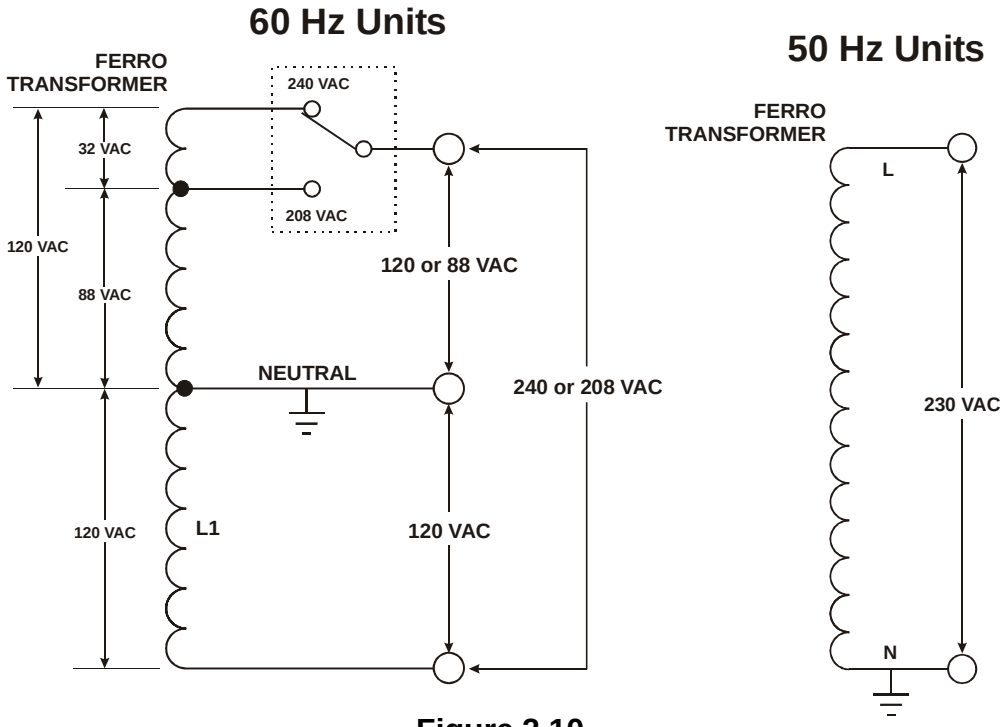


Figure 2.10
Transformer Output

2.8.2: Load Sharing

The total current drawn from each winding must not exceed that winding's maximum output current rating (Figure 2.11). For 60 Hz units, where possible, connect 120 VAC loads to L1.

CFR 3000 60 Hz		CFR 3000 50 Hz	
L1	25.0 Amps	L	13.0 Amps
L2	14.4 Amps	----------	

Figure 2.11
Transformer Output Current Ratings

Since loads are shared between windings, you can exceed a winding's output without exceeding the unit's maximum current output. There are two ways to calculate the current drawn by the loads; measuring or displaying the output current.

2.8 Transformer Output Load Sharing (Continued)

2.8.2.1: Measuring the Output Current

This uses a clip-on current probe (Figure 2.12 for 240 VAC, Figure 2.13 for 208 VAC and Figure 2.14 for 230 VAC).

For 120/208/240 VAC units the total current drawn from Winding 1 is the sum of the currents A, B and C where:

- **A** is the total current drawn by all of the 120V loads connected to the receptacle.
- **B** is the total current drawn by all of the 240V loads connected to the receptacle.
- **C** is the total current drawn from the L1 side of the terminal block.

The total of these currents must not exceed the rated output current for the L1 winding.

For the L2 winding of the transformer, measure the currents at points B and D where:

- **B** is the total current drawn by all of the 240V loads connected to the receptacle.
- **D** is the total current drawn from the L2 side of the terminal block.

The total of these currents must not exceed the rated output current for the L2 winding.

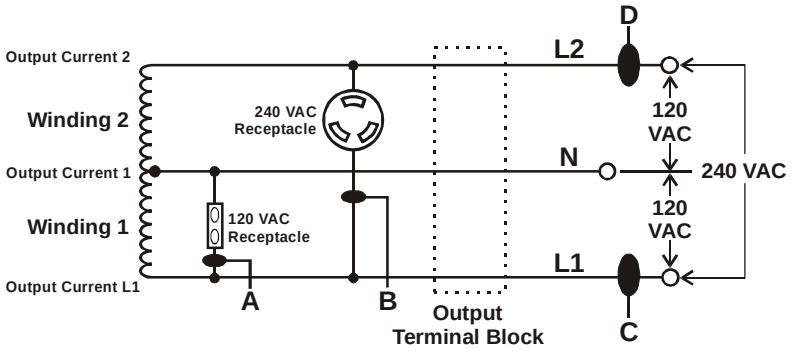


Figure 2.12
120/120/240 VAC Current Measurement Points

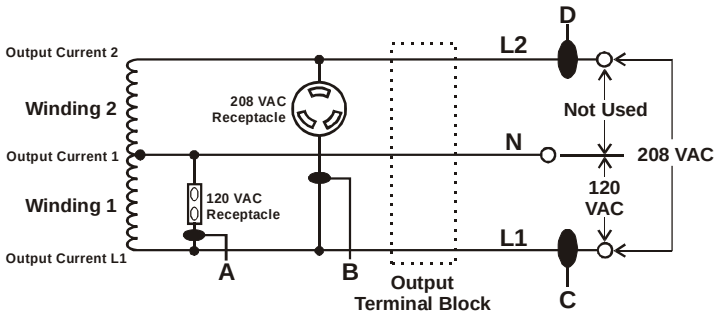


Figure 2.13
120/208 VAC Current Measurement Points

2.8 Transformer Output Load Sharing (Continued)

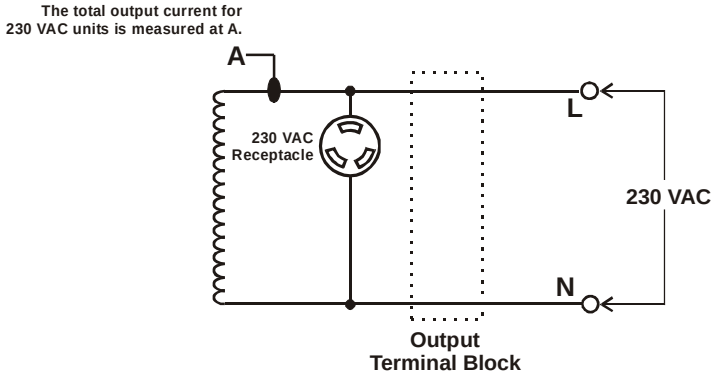


Figure 2.14
230 VAC Current Measurement Point

2.8.2.2: Displaying the Output Current

TIP: When using the display panels, you must calculate L1's current as described below.

Using the SID Display Panel:

The current is displayed via RS–232 as Output Current 1 and Output Current 2 (Section 4.4.3).

1. Use the menu to display Output Current 1 and Output Current 2.
2. The current in Winding 1 (Output Current L1) is the sum of Output Currents 1 and 2.
3. The current in Winding 2 is Output Current 2.

The Overload LED will flash if the total current in either winding exceeds its maximum rating or if the total output in VA or Watts exceeds the unit's maximum output.

Using the IID Display Panel:

1. Use the menu to display Output Current 1 and Output Current 2.
2. The current in Winding 1 (Output Current L1) is the sum of Output Currents 1 and 2.
3. The current in Winding 2 is Output Current 2.

Section 3
Operation

This section shows you how to operate the Alpha CFR 3000 and 3000RM UPS's:

- **How to turn the unit on and off (Sections 3.1, 3.2).**
- **How to start the unit's self test (Section 3.3).**
- **How to troubleshoot the unit with the SID (Section 3.4).**
- **How to use the Standard Interface Device (SID) (Section 3.5).**

3.1 Turning On the Unit

WARNINGS:

1) The unit runs warm to the touch. During the first few weeks of operation, a brand new unit may give off an odor caused by the burning of the lacquer finishing of the transformer. This is normal and is not toxic.

2) This unit generates electromagnetic radiation. Keep all sensitive magnetic media such as floppy disks, recording tape, key cards, bank and credit cards away from it.

Procedure:

1. Switch off:
   - All loads connected to the unit.
   - The input and battery circuit breakers (Figure 3.1).
2. Switch on the circuit breaker on the utility panel supplying power to the unit.
3. Switch on the Input circuit breaker.

   The display panel's Line Present LED turns on to show the unit is running on line power.

   TIP: There is a delay of 5 to 15 seconds before the unit energizes. If it has an SID, the Test LED flashes. If the unit does not turn on, perform troubleshooting (Sections 3.4, 5.2). Do not perform a cold start.
4. Switch on the Battery circuit breaker.
5. Do a self test (Section 3.3).
6. One at a time, turn on the loads.

   As each load is turned on, look at the load indicator on the control panel to make sure the unit is not overloaded (Section 3.5, "Output Load").

Start Up Finished

3.1 Turning On the Unit (Continued)

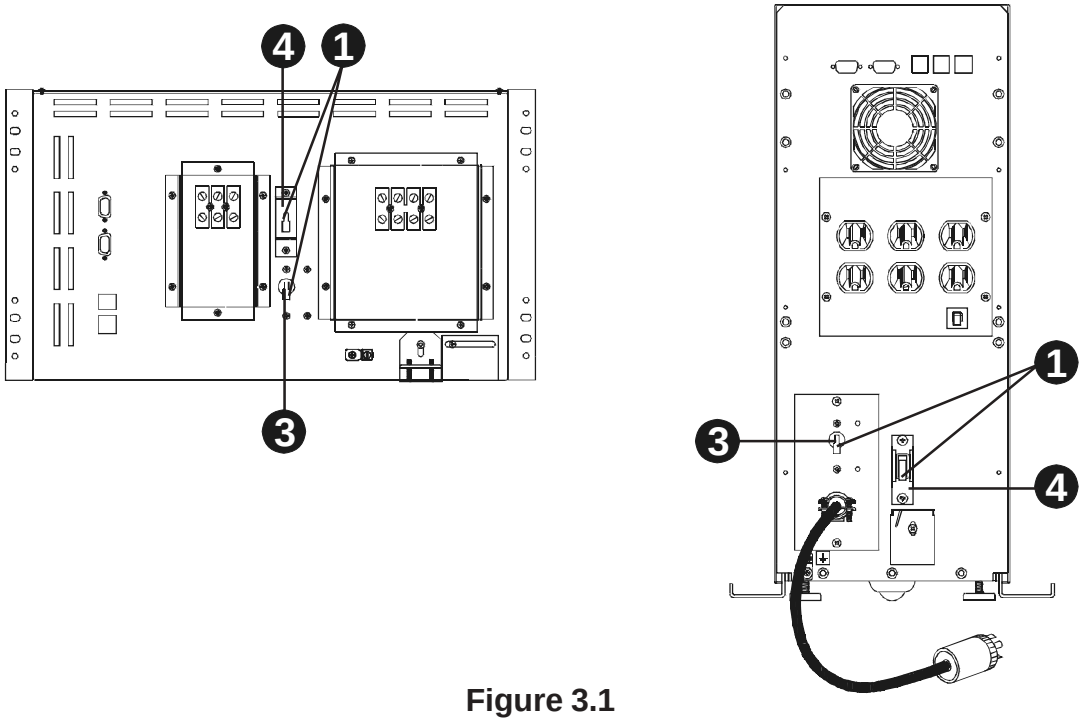


Figure 3.1
Turning the Unit On

Cold Start Procedure

This starts the unit with battery power when line power is unavailable or unqualified. Backup battery power is provided to the loads.

1. Switch on the Battery circuit breaker.
2. For units with the:
   - SID display panel, press the Manual Start button. The unit's alarm beeps every 20 seconds, indicating it is running on battery power.
   - IID display panel, press the Test button.

Cold Start Finished

3.2 Turning Off the Unit

The emergency shutdown procedure is on the inside rear cover.

Procedure:

1. One at time, turn off the loads.
2. Switch off the Battery circuit breaker.
3. Switch off the Input circuit breaker.
4. If servicing the unit, switch off the utility circuit breaker supplying the unit.

DANGER: During servicing put a warning note on the circuit breaker supplying the unit.

Shutdown Finished

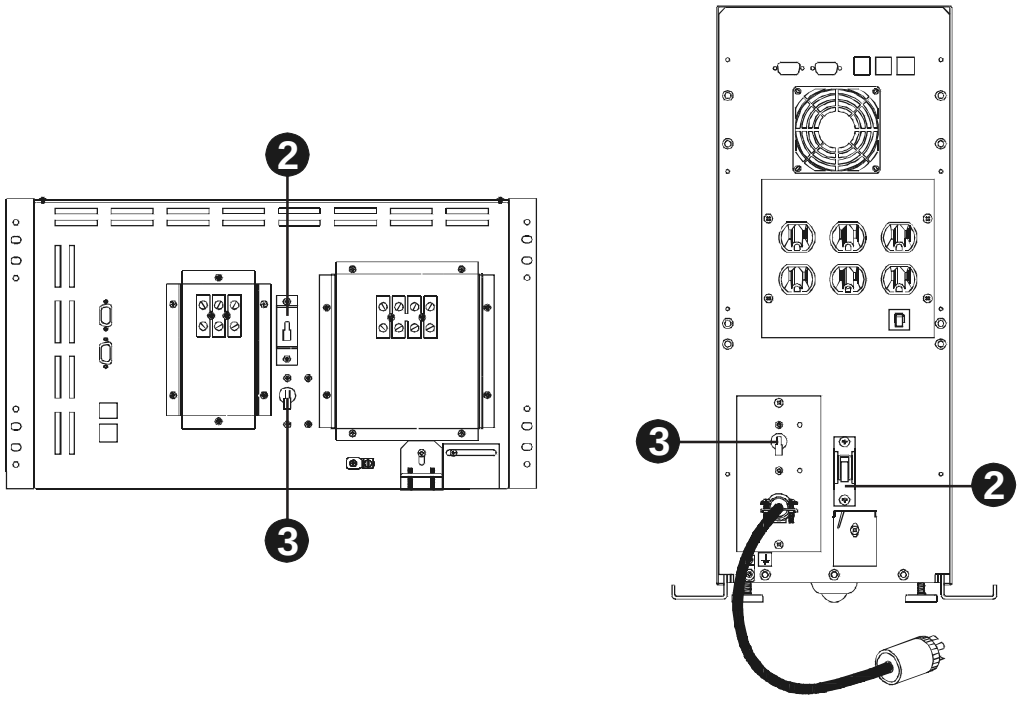


Figure 3.2
Turning the Unit Off

3.3 Testing the Unit

The self test confirms the unit can switch from line to backup battery power and back without interrupting power to the loads. It takes about one minute to run.

Before starting:

- The Battery circuit breaker must be on.
- The control panel's Line Present LED must be on.

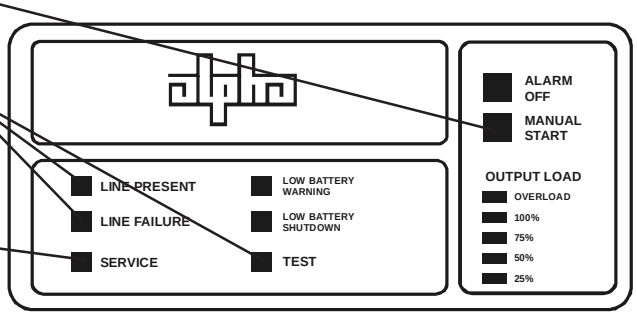
Procedure:

1. Press the Manual Start button down for 5 seconds.

   During the test, the Test, Line Present and Line Failure LEDs are on for about one minute.

2. If a fault is found, the unit defaults to Line Present operation without interrupting the output. The Service LED turns on. Do troubleshooting (Sections 3.4, 5.2).

   TIP: The unit cannot provide backup battery power when the Service LED is on.



Self Test Finished

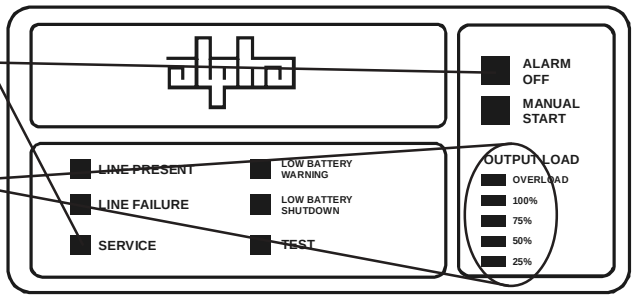
3.4 Troubleshooting With the SID

The SID's Output Load LEDs have two functions:

- When the unit is operating normally, it serves to show the unit's output loading.
- When the Service LED is on, the load LEDs are turned into a fault indicator for as long as the Alarm Off button is pushed and held down.

TIP: See Section 5.2 for more troubleshooting information.

Procedure:



1. When the Service LED is on, press and hold down the Alarm Off button.
2. The Output Load LEDs show a fault code. Refer to Figure 3.3 for the fault descriptions.
3. Fix the fault.
4. To clear some faults from the panel, you may have to restart the unit. For others, the unit automatically resets itself.

Troubleshooting Finished

TIP: If the line present LED flashes, the utility line is unqualified and the unit will not start.

LED	ON or Flashing	Malfunction	Action
Overload	ON	Fast detector low sensitivity active.	Contact Alpha Technologies.
Overload	Flashing	Not defined.	Not used in this unit.
100%	ON	High ambient temperature.	See if the fans are working.
100%	Flashing	PLL fault.	Contact Alpha Technologies.
75%	ON	Output voltage short circuit.	See the load is not short circuited. *
75%	Flashing	Output voltage high.	Contact Alpha Technologies. *
50%	ON	Power board EEPROM failure.	The operator cannot fix these malfunctions and should contact Alpha Technologies at once. *
50%	Flashing	Power board HWFLT or Power rail failure.	
25%	ON	Battery over voltage or battery fault.	See that the battery circuit breaker is on. **
25%	Flashing	Unit failed self test.	Check the battery. **

* After fixing the malfunction, these are cleared from the display panel by shutting down and restarting the unit.

** After fixing the malfunction, the unit automatically returns to Line Present mode, clearing the malfunction from the panel.

Figure 3.3
Fault Chart

3.5 Controlling the Unit with the Standard Interface Device (SID)

The Standard Interface Device (SID) display panel (Figure 3.4) shows vital operating parameters and starts the self test. It has two push buttons, five LEDs showing the power drawn by the loads and six LEDs showing the unit's operating status.

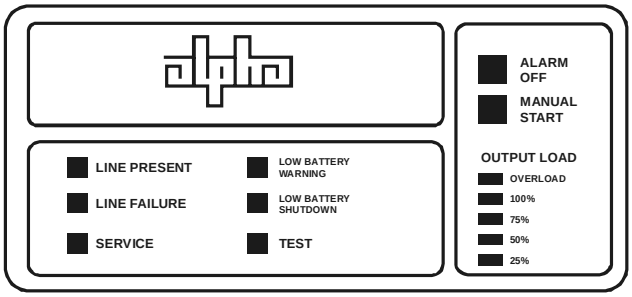


Figure 3.4
Standard Interface Device Display Panel

LEDs

Line Present

This green LED is:

- On when the unit is running on line power.
- Off when there is no line power.
- Flashing when the line is present but unqualified.

Line Failure

This yellow LED is on when:

- The line voltage is greater than +10 % or less than –20% of nominal voltage.
- The line frequency is outside of ± 3% of the nominal frequency.
- The unit is providing backup battery power to the loads.

TIP: Also see Low Battery Warning and Low Battery Shutdown.

Service

This red LED shows the unit has a malfunction. Press and hold down the Alarm Off switch and note which Output Load LEDs turns on or flashes (Section 3.4).

Low Battery Warning

This red LED turns on when the battery voltage is 8% below nominal. This shows the batteries are almost discharged and a shutdown is pending. You should begin a shutdown of the loads.

3.5 Controlling the Unit with the Standard Interface Device (SID) (Continued)

Low Battery Shutdown

This red LED turns on when the battery voltage is 12% below nominal. The unit automatically shuts itself down and no longer provides power to the loads to prevent overdischarge damage to the batteries.

Test

This yellow LED shows the unit is in self test mode (Section 3.3). If it fails the test, the Service LED is on and the unit defaults to Line Present operation. You should do troubleshooting as shown in Sections 3.4 or 5.2.

TIP: At start-up, this LED flashes for about 5 to 15 seconds.

Line Synchronization

If both the:

- Line Power
- Line Failure

LEDs are on, the unit is synchronizing its output with the input before starting Line Present operation. This takes about 15 seconds.

Push Buttons

Alarm Off

This turns off most audible alarms. The alarm is off until another alarm occurs.

TIP: Some alarms, such as Line Failure, cannot be turned off and will continue to sound every 20 seconds. If the Service LED is on, press and hold down the Alarm Off switch and note which Output Load LEDs turns on or flashes (Section 3.4).

Manual Start

This starts the unit with battery power when line power is absent or unqualified.

It can also be used as a self test. If the Line Present LED is on, press it for 5 seconds. This tests the inverter and batteries for one minute by providing backup battery power to the loads, returning to line present mode when done.

3.5 Controlling the Unit with the Standard Interface Device (SID) (Continued)

Output Load

These five green LED's show the unit's loading as a percentage of its maximum output.

The Overload LED is on if:

- The output exceeds the unit's maximum rating.
- The output exceeds either of the transformer output winding ratings (Section 2.8).

WARNING: Do not run the unit when it is overloaded. Damage to the unit, the inverter or the batteries can result.

If the unit is in Output Voltage Shutdown mode the LED's will continuously sequence until the condition is cleared (Section 4.5.2, "Sub Menu #50: Set Output Shutdown Parameters").

Section 4
Communication

This section shows you how to control the Alpha CFR 3000 and 3000RM UPS's with RS–232 commands:

- **How to set up communications with Windows© HyperTerminal (Section 4.1).**
- **How to understand and use the opening menu (Section 4.2).**
- **A description of the menu tree (Section 4.3).**
- **A description of the system, input and output and battery parameters menus (Section 4.4).**
- **Descriptions of the user and maintenance parameters (Sections 4.5 and 4.6).**
- **How to connect and setup an external modem to the unit (Section 4.7).**

Windows is a copyright of the Microsoft corporation.

4.1 RS–232 Set-Up

Wire the DB–9 connector as shown in Section 2.6, “Connecting the RS–232 Port.”

Windows HyperTerminal Connection

For this tutorial, Com 1 is used and the unit is called CFR.

Procedure

1. The path is **Start/Programs/Accessories/ Communications/HyperTerminal**.

2. Click on the **Hypertrm.exe** icon. The ***Connection Description*** screen appears (Figure 4.1).

   Enter a name and choose an icon for your unit. Click **OK**.

Figure 4.1
Connection Description Screen

3. The ***Connect To*** screen appears (Figure 4.2).

   Connect to COM 1. Click **OK**.

Figure 4.2
Connect To Screen

4.1 RS–232 Set-Up (Continued)

4. The ***Com 1 Properties*** screen appears (Figure 4.3). Fill out the fields as shown.

5. Click **OK**.

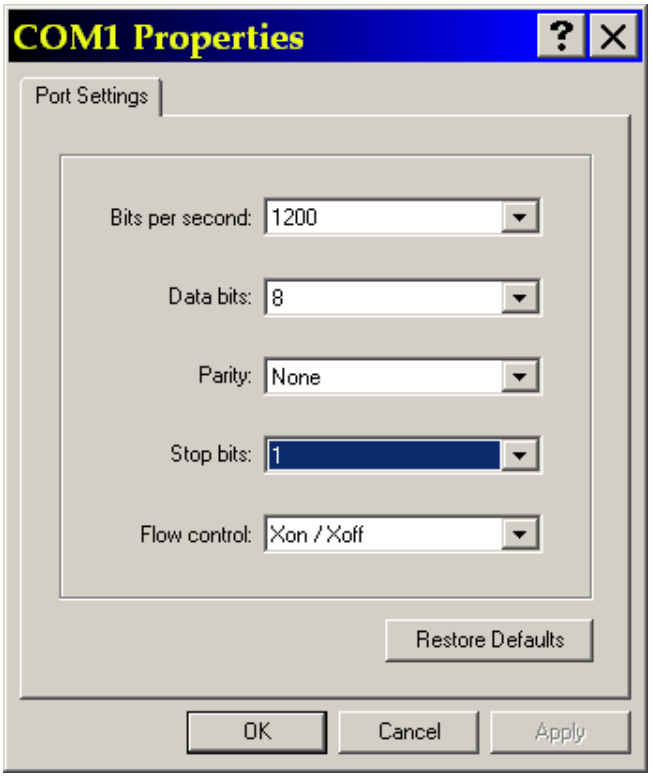


Figure 4.3
COM 1 Properties Screen

6. The CFR Screen appears.

7. Press **Enter** to go to the Opening Menu (Figure 4.4).

   The Opening Menu (Figure 4.5) appears.

HyperTerminal Set-Up Finished

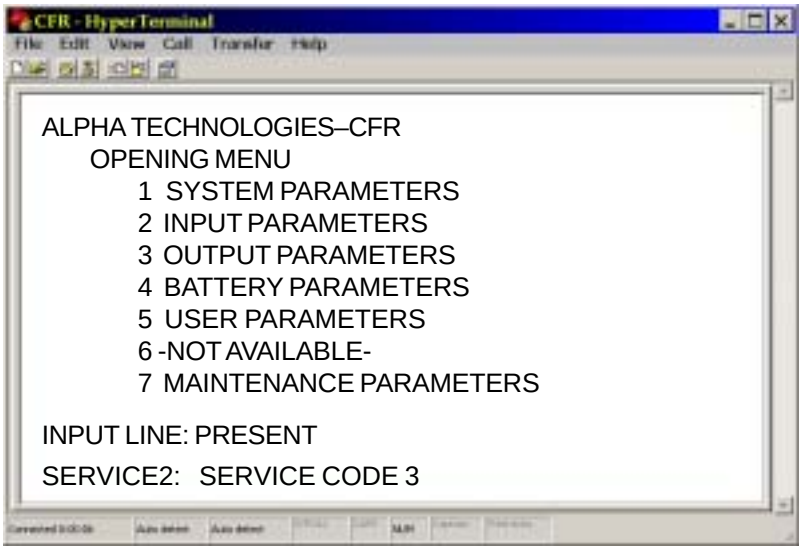


Figure 4.4
Opening Menu in CFR Screen

4.2 Using the Opening Menu

The opening menu (Figure 4.5, also see Figure 4.4) is the top-level menu. It shows the line's status, displays if any alarms are present and gives access to the main menus. It is reached from anywhere in the menu tree by pressing **Enter**.

The entire menu tree is given in Section 4.3. Tables describing the main and sub menus are given in Sections 4.4 to 4.7.

Procedure:

To access a particular main or sub menu, type in the number and press **Enter**. Pressing **Enter** returns you to the opening menu screen.

Tips:

- The readings on the screen do not automatically update to reflect changes in the unit's status. To update it type in the number and press **Enter**.
- For many functions you need to enter a password. The factory set password is 1111.
- If you change the password (Item #58), make sure you record the new password in a safe and easily accessible place.
- This program ignores the Backspace and Delete keys. If a command is typed in wrong, press **Enter** and retype the command.
- "Service2: Service Code 3" is displayed in the alarm field every time the unit starts. This is normal. To clear it, press **Enter**.

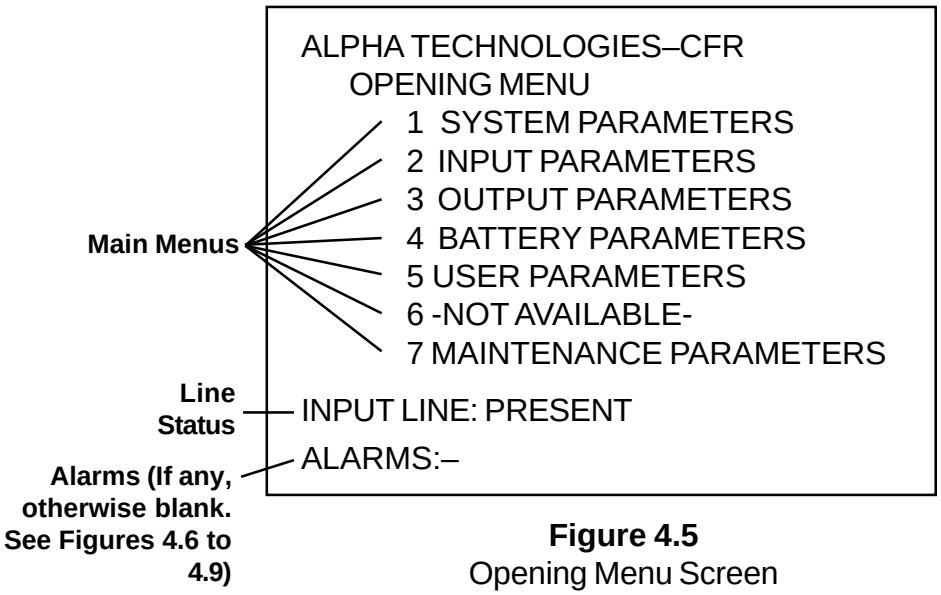


Figure 4.5
Opening Menu Screen

4.2 Using the Opening Menu (Continued)

Figures 4.6 to 4.9 list the alarms, how they appear on the screen and what they mean.

Input Alarms		
Name	**Shows on Screen**	**Cause**
Frequency Low	**FREQ_LO**	The input frequency is low.
Frequency Hi	**FREQ_HI**	The input frequency is high.
Glitch	**GLITCH**	The unit detects a glitch.
Spike	**SPIKE**	The unit detects a spike.
Sag	**SAG**	The unit detects a sag.
Surge	**SURGE**	The unit detects a surge.
Brownout	**BROWNOUT**	The unit detects a brownout.
Slow Surge	**SLOW_SURGE**	The unit detects a slow surge.
Blackout	**BLACKOUT**	The input voltage is lost for 12 ms or the RMS voltage is less than 1/2 the nominal voltage for more than 100 ms.

Figure 4.6
Input Alarms

Battery Alarms		
Name	**Shows on Screen**	**Cause**
Low Battery Shutdown	**LOW_BATT_SHTDWN**	The battery voltage is 12% below nominal and the unit has shut off output power to the loads to prevent over discharge damage to the batteries.
Low Battery Warning	**LO_BATT_WARN**	The battery voltage is 8% below nominal and this shows the batteries are almost discharged and a shutdown is pending. You should start shutting down the loads.
High Battery Voltage	**BATT_VOLT_HI**	The charger voltage is higher than it should be for the batteries. This can be caused by a faulty charger or batteries or defective connection to external batteries.
Failed the Self Test	**FAIL_SELF_TEST**	The unit cannot provide output power while doing the self test. You should see that the battery and output circuit breakers are on and that the batteries are not damaged.
Battery Fault	**BATT_FLT**	The unit cannot charge the batteries. Usually this is caused by the batteries not being connected to the unit or the battery circuit breaker is off.

Figure 4.7
Battery Alarms

4.2 Using the Opening Menu (Continued)

Output Alarms		
Name	**Shows on Screen**	**Cause**
Output Voltage Low	**VOLT_LO**	The unit is over loaded or there is a unit fault. Reduce the number of loads connected to the unit.
Output Voltage High	**VOLT_HI**	This can be caused by: --A piece of equipment that draws power at irregular intervals. Disconnect the suspect equipment and see if the alarm repeats. --The unit is defective. Have it serviced by Alpha.
Output Power Overload	**PWR_OVLD**	The unit's output is overloaded. The unit may go into shutdown mode to protect itself from being damaged.
Output VA Overload	**VA_OVLD**	The RMS output current exceeds the unit's rating. Disconnect loads until this alarm is discontinued.
Output Overvoltage Fault	**OVER_V_FLT**	The unit has a malfunction in its internal control circuits. The output is shut off to protect the loads from high voltages.
Output Short Circuit	**SHORT_CCT**	A load is short-circuited. This can be caused by improper wiring of the load or a faulty load.

Figure 4.8
Output Alarms

Environmental and Service Alarms		
Name	**Shows on Screen**	**Cause**
Internal Temperature High	**AMB_TEMP_HI**	The internal temperature is high. This can be caused by: --A sustained unit overload. --Blocked fan(s). --High temperature at the unit's location.
Phased Lock Loop Failure	**SERV CODE 1**	The unit cannot lock onto the line frequency because it is unstable. If the unit is operating off of a generator, see that its frequency is stable.
Micro Software Reset	**SERV CODE 2**	The unit's microprocessor has detected an internal fault and reset itself. If this continues, contact Alpha.
Micro Hardware Reset	**SERV CODE 3**	This normally happens during start up. If this happens during normal operation contact Alpha.
Power Board EEPROM Fault	**SERV CODE 4**	The operator cannot fix this fault and should contact Alpha at once.
Power Board Hardware Fault	**SERV CODE 5**	The power board has a fault. Contact Alpha.
Negative DC Supply Rail Fail	**SERV CODE 6**	The unit has a fault. Contact Alpha.
Emergency Power Off	**EMGNCY POFF**	The Emergency Power Off function was activated.
Output Shutdown	**OUTV SHTDWN**	The output has been shut down via RS-232.

Figure 4.9
Environmental and Service Alarms

4.3 Menu Tree

- To reach any main or sub menu from the opening menu, type its number and press **Enter**.
- Detailed descriptions of each menu is given in Sections 4.4 to 4.7.

Menu Tree:

Opening Menu

1 System Parameters
- Battery Temperature
- **11** Start Test
- **12** Stop Test

2 Input Parameters
- Voltage
- Current
- Volt Amps
- Power in Watts
- Power Factor
- Line Frequency

3 Output Parameters
- Output #1
  - Voltage
  - Current
- Output #2
  - Voltage
  - Current
- Volt Amps
- Power in Watts
- Power Factor
- Line Frequency

4 Battery Parameters
- Voltage
- Current
- Charger Status
- Temperature

Main Menu

Sub Menu

To reach any main or sub menu, type its number and press **Enter**.

5 User Parameters
- **50** Output Shutdown Setup
- **52** External Modem Setup
- **53** Set Test Start (DD:HH:MM=00:00:00)
- **55** Set Test Frequency (off)
- **56** Transmit Unsolicited Alarms
- **58** Set User Security code
- **59** Set Maintenance Security code
  - CFR software ver. XX.XX
  - Micro SerNo XXXXXXXX
  - EEProm Ver. XXXXXXXXXX
  - Power Board SerNo XXXXXXXX

6 -Not Available- (History Logs if IID is installed)

7 Maintenance Parameters
- **70** Fast Detect Low Ref
- **71** Fast Detect High Ref
- **72** Medium Detect Low Ref
- **73** Medium Detect High Ref
- **74** Slow Detect Low Ref
- **75** Slow Detect High Ref
- **76** Slow Detect Hys. Lo Ref
- **77** Slow Detect Hyst Hi Ref
- **78** Max PLL Slew Rate
- **79** Battery Warning Ref

4.4 System, Input, Output & Battery Parameters

Main menus #1 to #4 are read only menus which display important operating parameters.

4.4.1 Main Menu #1: System Parameters

This displays the battery temperature (°C) and starts and stops the self test.

- Sub menu 11 starts the self test. The test's default duration is 60 seconds.
- Sub menu 12 lets you stop the test before it has finished.

4.4.2 Main Menu #2: Input Parameters

This displays selected input parameters.

Input Parameters		
Voltage	XXX Volts	The line's voltage.
Current	X.X Amps	The line's current.
Volt Amps	XXXX VA	The apparent input power.
Power in Watts	XXXX Watts	The true input power.
Power Factor	X.XX	The ratio of true power to apparent power at the input.
Line Frequency	XX.X Hz	The line's frequency.

Figure 4.10
Input Parameters Menu

4.4 System, Input, Output & Battery Parameters (Continued)

4.4.3 Main Menu #3: Output Parameters

This displays selected output parameters. See Figure 4.12 for 120/208/240 VAC, 60 Hz units to see where the voltages and currents are measured. See Figure 4.13 for 230 VAC, 50 Hz units.

TIP: If the unit has dual outputs, you have the option of displaying the voltage and current of each output individually.

Output Parameters		
Voltage	XXX Volts	Output voltage #1 is the true RMS output voltage for the 120 VAC side of the unit and the voltage between the terminal block's L1 and N. For 230 VAC units, the voltage measurement is done between N and L. Output voltage #2 is the true RMS output voltage for the 208 or 240 VAC side of the unit and the voltage between the terminal block's L1 and L2. This is not used in 230 VAC, 50 Hz units. TIP: The Voltage between N and L2 is calculated by subtracting Output Voltage #1 from Output Voltage #2. This is not done for 230 VAC, 50 Hz units.
Current	X.X Amps	Output current #1 is the true RMS output current on N. Output current #2 is the true RMS output current on L2. This is not used in 230 VAC, 50 Hz units.
Volt Amps	XXXX VA	The apparent output power.
Power in Watts	XXXX Watts	The true output power.
Power Factor	X.XX	The ratio of true power to apparent power at the output.
Line Frequency	XX.X Hz	The output's frequency.

Figure 4.11
Output Parameters Menu

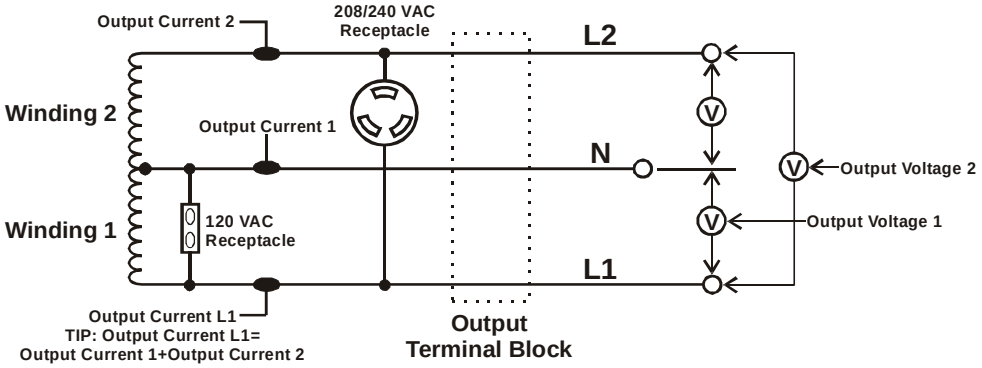


Figure 4.12
Output Voltage and Current Measurement Points (120/208/240 VAC, 60 Hz Units)

4.4 System, Input, Output & Battery Parameters (Continued)

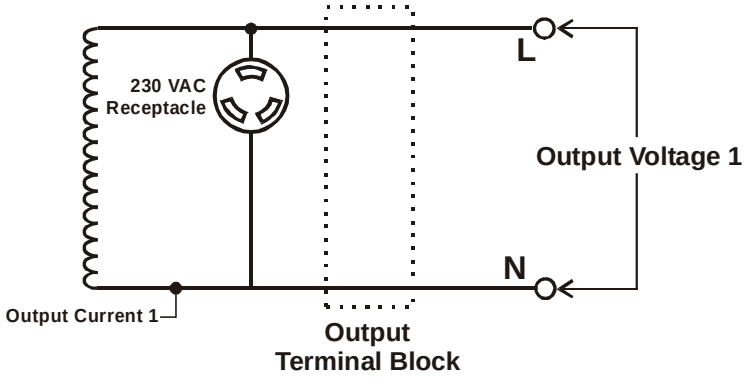


Figure 4.13
Output Voltage and Current Measurement Points (230 VAC, 50 Hz Units)

4.4.4 Main Menu #4: Battery Parameters

This displays the battery voltage, the charger current and the charger's status. Item #40 is disabled in this model.

Battery Parameters		
Voltage	XX.X Volts	This is the DC voltage of the battery string. Fully charged batteries have a charge of about 55 VDC. Low battery cut off is at about 42 VDC. If external battery packs are attached, their voltage is included in this measurement.
Current	X.X Amps	In Line Present mode, the DC charger current is displayed.
Charger Status	ON: The unit is in Line Present mode. The batteries are charging. OFF: The unit is in Line Failure mode. The charger is turned off and the batteries are providing backup power. When line power returns or a backup generator is connected, the charger automatically turns on to recharge the batteries.	
Temperature	The ambient battery temperature in °C.	

Figure 4.14
Battery Parameters Menu

4.5 User Parameters

Main menu #5, user parameters, lets you set up the automatic self test, remotely shut down the unit, change the password and set up RS–232 communications with or without an external modem.

To access most of these functions, you need to enter a password. The factory set password is 1111. If you change it (Items #58 and #59), make sure you keep a copy of it in a safe and easily accessible place or you will not be able to access the unit.

4.5.1 Menu Overview

The readouts:

- CFR software ver. XX.XX
- Micro SerNo XXXXXXX
- EEProm Ver. XXXXXXXXXX
- Power Board SerNo XXXXXXX

tell you what version of software, hardware and microprocessor are installed in your unit.

User Parameters	
50 Output Shutdown Setup	This allows you to shutdown and start up the output. This menu's use is explained in Section 4.5.2, "Sub Menu #50: Set Output Shutdown Parameters."
52 External Modem Setup	This allows you to connect an external modem to the unit. This menu's use is explained in Section 4.7, "Installing and Using the External Modem."
53 Set Test Start	This starts a countdown clock to tell the unit when to start a self test. Entering "06:05:04" tells the unit to start a self test in 6 days, 5 hours and 4 minutes. The clock starts when Enter is pushed. TIP: The unit does not have a real time clock, so the actual test start time may be not be exactly the time you calculated it to start at.
55 Set Test Frequency	This tells the unit to do a self test on a regular basis every dd days where dd is the number of days between tests. When the screen shows "OFF" this feature is disabled. This is done by entering 0 days in the test frequency. The maximum number of days that can be entered is 30.

Figure 4.15
User Parameters Menu

4.5 User Parameters (Continued)

User Parameters (Continued)	
56 Transmit Unsolicited Alarms	This allows you to start or stop the transmission of unsolicited alarms. This menu's use is explained in Section 4.5.3, "Sub Menu #56: Transmit Unsolicited Alarms."
58 Set User Security Code	This lets you change the password. The factory set password is 1111. If you change it, make sure you keep the new code in a safe, secure place. If you loose the new password, you will not be able to access the unit. The password is four numbers or letters long.
59 Set Maintenance Security Code	This lets you change the maintenance password which gives access to the maintenance menus (Section 4.6). The factory set password is 1111. If you change it, make sure you keep the new code in a safe, secure place. If you loose the new password, you will not be able to access the unit. The password is four numbers or letters long.

Figure 4.15
User Parameters Menu (Continued)

4.5.2 Sub Menu #50: Set Output Shutdown Parameters

These menus allow you to turn the unit's output on and off and set when it starts, for how long and under what conditions it should return to line mode.

Set Output Shutdown Parameters	
500 Enable Output Shutdown via Rx Line	This allows you to remotely shutdown and start up the unit's output via the RS-232 link. The default setting, "NO" shuts off this feature. If you want to control the output, set this to "YES."
501 Start Shutdown When Delay is Set	If set to "Yes," the unit starts a shutdown after the delay is over (Item #505). If set to "No," the unit waits for a shutdown command (Item #502) before starting the shutdown.

Figure 4.16
Set Output Shutdown Parameters Menu

4.5 User Parameters (Continued)

Set Output Shutdown Parameters (Continued)	
502 Start Output Shutdown	This starts the shutdown. The 6 Power LEDs on the display panel flash in sequence to show the unit is alive, but the output is turned off. Use Items #505 and #506 to set the delay and duration, then use this command to start the shutdown. This item displays the output's current status: --"OFF": No shutdown is scheduled. --"Shutting down in "hh:mm:ss": The time until shutdown happens. --"Shutdown in progress": The unit's output is off.
503 Cancel Output Shutdown	This cancels any programmed or active shutdown.
504 Recover Output Shutdown Only When AC Line Restored	This controls when the unit starts output power after a shutdown. If set to "YES", the output resumes only when the line is present and qualified. If set to "NO", the output resumes after the shutdown is finished. If the line is not present or qualified, backup battery power is sent to the output.
505 Set Output Shutdown Delay	This sets a shutdown delay. The default value is 0, which means the unit will shutdown as soon as an Item #502 command is sent. Entering "06:05:04" sets a delay of 6 hours, 5 minutes and 4 seconds.
506 Set Output Shutdown Duration	This controls how long the unit is shut down. The default setting is 5 seconds. Entering "06:05:04" sets a shut down of 6 hours, 5 minutes and 4 seconds.
507 Shut Off Inverter/ Save Battery	This shuts off the inverter to save battery power. This command can only be used when the unit is in Line Failure mode. When the line returns or becomes requalfied, the unit automatically resumes Line Present mode.
508 Start Up Inverter From Save Battery	This turns on the inverter after an Item #507 command is started. Backup battery power is provided to the load.

Figure 4.16
Set Output Shutdown Parameters Menu (Continued)

4.5 User Parameters (Continued)

4.5.3 Sub Menu #56: Transmit Unsolicited Alarms

These menus allow you to prevent or delay the continuous transmission of alarms in areas with unstable line power.

Transmit Unsolicited Alarms	
509 Disable Transmission of Unsolicited Alarms	Setting this to "Active" stops the transmission of all unsolicited alarm messages. "509 None (xxxx)" where xxxx= "Active" or blank. Active is default.
510 Transmit IPC-XXX Type Unsolicited Alarms	Setting this to "Active" makes the unit send unsolicited ASCII alarm messages whenever the unit's status changes. The following are a list of messages: UPS000: Power up UPS001: Input out of tolerance UPS002: Input blackout UPS003: Inverter on UPS004: Line mode UPS005: Low battery warning UPS006: Low battery shutdown UPS007: Overload UPS008: Load OK UPS009: High temperature UPS010: OK temperature UPS011: Service required UPS012: UPS malfunction UPS013: Self test (Inverter On) UPS014: Passed self test (Unit in line mode) UPS015: Failed self test
511 Delay Transmission of Unsolicited Alarms	This delays the transmission of the "Inverter On" alarm (UPS003) to avoid false alarms due to brief line dropouts. Setting this to "OFF" causes all line interruptions to be displayed. The default setting is off and the delay can be set from 1 to 5 minutes. "Inverter on Alarm Delay (xxxx)" where xxxx= "off" or "m min " where m is 1 to 5 min. Off is default.

Figure 4.17
Transmit Unsolicited Alarms Menu

4.6 Maintenance Parameters

Main menu #7, maintenance parameters, allows you to adjust the unit's detection and warning parameters to suit your local line conditions. Usually these factory settings never have to be changed.

CAUTION: Improper settings can damage the unit. If you have any questions, contact Alpha Technologies before changing them.

Maintenance Parameters	
70 Fast Detect Low Ref	Increasing this makes the unit more sensitive to a fast, low amplitude line disturbance (glitch).
71 Fast Detect Hi Ref	Increasing this makes the unit more sensitive to a fast, high amplitude line disturbance (spike).
72 Medium Detect Lo Ref	Increasing this makes the unit more sensitive to a slow, low amplitude line disturbance (sag).
73 Medium Detect Hi Ref	Increasing this makes the unit more sensitive to a slow, high amplitude line disturbance (surge).
74 Slow Detect Lo Ref	Increasing this makes the unit more sensitive to a slow, low amplitude line disturbance (brownout). NOTE: The Slow Detect Hyst Lo Ref (76) should be adjusted by the same amount.
75 Slow Detect Hi Ref	Increasing this makes the unit more sensitive to a slow, high amplitude line disturbance (sustained overvoltage). NOTE: The Slow Detect Hyst Hi Ref (77) should be adjusted by the same amount.
76 Slow Detect Hys Lo Ref	Increasing this raises the voltage level at which the unit resumes Line mode after the line returns to normal. This should be 1 to 3 settings higher than the Slow Detect Lo Ref (74) setting.
77 Slow Detect Hys Hi Ref	Increasing this lowers the voltage level at which the unit resumes Line mode after the line returns to normal. This should be the same or 1 to 3 settings higher than the Slow Detect Hi Ref (75) setting.
78 Max PLL Slew Rate	Increasing this will reduce the speed at which the unit changes the Phased Lock Loop (PLL) output frequency when it resumes Line Present after the line becomes requalified. It will also increase the time required to resume Line Present operation.
79 Battery Warning Ref	Increasing this will increase the time before a Low Battery Warning is given, allowing the batteries to drain further before a warning is given. Decreasing it allows more run time between Low Battery Warning and Low Battery Shutdown.

Figure 4.18
Maintenance Parameters Menu

4.7 Installing and Using the External Modem

Uses of the External Modem

Where a network is not available, you can connect an external modem to the CFR's RS–232 port.

The modem lets you:

- Program the CFR to send an alarm message to a remote host via the telephone line when a power event takes place.
- Dial up the CFR for remote monitoring or control. Once connected, all RS–232 menus are accessible.

Equipment and Settings

Equipment:

- An external modem (US Robotics Sportster (1200, 9600, 19.2K or 28.8K baud) or other "Hayes Compatible" modem).
- A standard null modem cable, DB–9 male to DB–25 male.
- Phone line access.
- One-time access to the CFR via a computer link.

Settings:

- RS–232 Speed: 1200 Baud between CFR and modem.
- RS–232 Signals: Rx, Tx and Gnd.
- Handshaking: None, neither hardware (RTS/CTS) nor software (XON/XOFF) are used.
- Modem Speed: Same as the modem's.

4.7 Installing and Using the External Modem (Continued)

Step 1: Enable the CFR's Modem Feature

The CFR is shipped with the modem feature disabled. To enable it:

1. Connect a computer to the CFR's RS–232 port (Sections 2.6, 4.1).

2. Go to Menu Item #52 (Figure 4.19). For explanations of each item see "Modem Setup and Control: Sub Menu #52" in this section.

External Modem Setup
- 520 Enable Automatic Alarms (No)
- 521 Enable Remote Access (No)
- 522 Set Alarm Actions (11111111)
- 523 Set Inverter Alarm Delay (0)
- 524 Set Dial 1 Phone Number (ATDT 234-5678)
- 525 Set Dial 2 Phone Number (ATDT 234-5678)
- 526 Set Location ID (CFR UPS in Rm 123)
- 527 Set Custom init cmd (ATDT X4Q0V1&H0&R1&I0&B1)
- 528 Set Remote Hang up Time (2)
- Last Modem Response (N:)

Figure 4.19
External Modem Setup Screen (Showing Default Values)

3. To enable the Automatic Alarm notification, change the following:

   i Make sure "Unsolicited Alarms" (Item #509) is disabled (blank instead of "active").

   ii Set the monitoring station's phone number in Items # 524 "Dial 1" or #525 "Dial 2"

   iii If you are not using a US Robotics Sportster, set "Custom Init cmd" (Item #527) to the values your modem uses (Step 2: Connect and Configure the Modem, #3).

   iv If you have more than one unit, set the "Location ID" (Item #526) to a unique, descriptive string (e.g. Rm 222).

4. Set "Enable Automatic Alarms" (Item # 520) to YES.

5. If you want remote dial-in access to the RS–232 menus, set "Enable Remote Access" (Item #521) to YES.

4.7 Installing and Using the External Modem (Continued)

Step 2: Connect and Configure the Modem

Use a shielded, null-modem serial cable, DB–25 male to DB–9 male, to connect the modem to the CFR.

1. The most common ways to connect the cable are:
   - A null-modem cable with DB–25 male to DB–-9 male ends (Figure 4.20).
   - A null-modem cable with DB–25 male to DB–25 male ends and a 9–25 adapter.
   - A standard straight-through cable with DB–9 male to DB–25 female and a null-modem adapter.

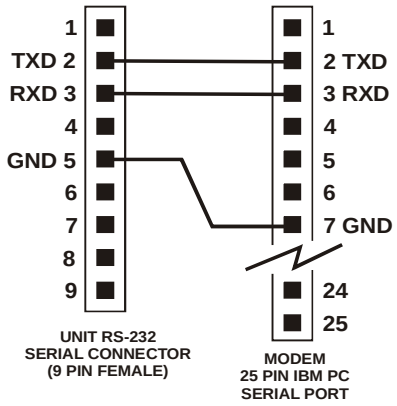


Figure 4.20
External Modem Cable Wiring

2. Set the modem's DIP switches as shown in Figure 4.21.

TIP: Do not enable auto answer with the DIP switches.

Modem DIP Switch Settings			
Switch	Option	Switch	Option
1	Set modem to ignore DTR (DTR Override).	5	Disable auto answer.
2	Set modem to generate verbal (not numeric) results.	6	Set modem to CD when it connects.
3	Set modem to generate result codes.	7	Set modem to load factory setting on power up.
4	Disable echoing of commands (Echo suppressed).	8	Set modem to recognize AT commands (smart mode).

Figure 4.21
Modem DIP Switch Settings

4.7 Installing and Using the External Modem (Continued)

❸ The initialization string (Item #527) is a set of commands the CFR sends to the modem to initialize it. For a US Robotics modem, the string is:

- **ATX4Q0V1&H0&R1&I0&B1**

  Where:

  - **X4:** Extended set of result codes.
  - **Q0:** Result codes are displayed.
  - **V1:** Display verbal (words not numbers) result codes.
  - **&H0:** Disable transmit data flow control (neither hardware “CTS” nor software “Xon/Xoff” flow control).
  - **&R1:** Disable hardware receive data flow control (set modem to ignore RTS and send data all the time).
  - **&I0:** Disable software data flow control (no “Xon/Xoff” flow control).
  - **&B1:** Set the RS–232 serial port rate to fixed (set modem to detect the AT command baud rate and maintain it).

The first three commands are supported by all Hayes-compatible modems. The last four are supported by US Robotics and some other manufacturers.

TIP: Do not include the auto answer command in the initalization string. The CFR sends an AT command to control the auto answer mode (either “ATS0=1” or “ATS0=0”).

For modems that do not support the extended Hayes commands, you should create an equivalent command. In most cases the simplified string:

- **ATQ0V1**

works well.

4.7 Installing and Using the External Modem (Continued)

Step 3: Initalize the Modem

To initalize the modem start a CFR self test (Section 3.3).

The CFR must initialize the modem. If a remote host calls before initialization, the CFR/ modem combination will not answer the call.

TIP: If the modem is set for auto answer and a call is answered before the CFR initalizes it, the modem uses its own baud rate which may not be the 1200 baud used by the CFR. In this case the CFR cannot talk to the modem.

The modem must be set for **No Answer**. When the CFR initalizes the modem, it automatically sets the RS–232 rate to 1200 baud.

The CFR automatically sends out the initialization string (Item #527):

- One minute after CFR power up and then every hour after.
- At the start of a self test.
- Before sending out the first automatic alarm.
- Every two minutes after a failed modem command (dial, hang or initialize).
- After starting one of the modem options.

This guarantees the modem is initialized before sending out the first automatic alarm.

If initalization fails, the CFR assumes the modem is on line, sends an escape sequence, resets the modem and then resends the initalization string. This will not work if the modem is using a different baud rate than the CFR's. If this fails, the CFR sends the initialization sequence every two minutes until initalization is successful.

Step 4: Accessing the RS–232 Menus (If Used)

Enabling the remote access feature (Item #521) allows you to call the CFR to have access to all RS–232 menus. The auto answer command (ATSO=1) is sent to the modem during initalization.

If a call is in progress and no RS–232 commands are received for longer than the remote hang up time (Item #528) the CFR tells the modem to disconnect from the host. This stops a faulty host from tieing up the phone line and preventing other calls from being received or alarms from being sent out.

Modem Installation Finished

4.7 Installing and Using the External Modem (Continued)

How the CFR Sends Alarms

To send an alarm, the CFR sends the dial command to the modem and waits up to 60 seconds for a “connect.” If this fails, it will try the same dial command two minutes later if the modem responds back to the CFR with a “No Carrier,” “No Dial Tone” or “Busy” messages.

If the modem does not respond (it is disconnected, not powered or is inoperable), the CFR tries to initalize the modem. It then sends a dial command every two minutes until it is successful. A successful command is when the modem replies with a “connect” message in less than 60 seconds.

The CFR stores alarm messages in a buffer that holds up to 7 messages. When the modem is operating, it sends the alarms out in the order they occurred. If the buffer is full, the oldest message is discarded and the newest added.

After sending the alarms, the CFR sends a escape command (+++) followed by the hang command (ATH) to the modem to end the session.

Modem Setup and Control: Sub Menu #52

Sub menu #52 (Figures 4.19 and 4.22) allows you to set up the modem, set the Dial 1 and 2 phone numbers and give the CFR an identity.

For most functions you will be asked for a password. The factory set password is 1111. If you change it, make sure you keep it in a safe and accessible place.

Continued on the next page.

4.7 Installing and Using the External Modem (Continued)

<table>
<tr><th colspan="3">External Modem Setup Menus</th></tr>
<tr><td>520
Enable Automatic Alarms</td><td colspan="2">Enable this feature near the end of the configuration session since the CFR will try to communciate with the modem two minutes after this feature is activated.

When set to "Yes," this causes the modem to dial out and report a problem when it occurs (see Item #522). The default value is No. When enabling this feature, disable the Unsolicited Alarm Feature (Item #509).</td></tr>
<tr><td>521
Enable Remote Access</td><td colspan="2">Enable this feature near the end of the configuration session since the CFR will try to communciate with the modem two minutes after this feature is activated.

When set to "Yes," this causes the CFR to set the modem to answer calls from a remote hosts on the first ring. The default value is No.

Once a connection is established, you can access all of the RS-232 menus. The connection exists until either the host drops the connection or the "Remote Hang Up Time" expires (Item #528).</td></tr>
<tr><td>522
Set Alarm Actions</td><td colspan="2">This menu specifies what action the CFR should take when various power events happen. The three possible actions are:

--NONE: Take no action, ignore the event.
--DIAL 1: Call the Dial 1 phone number and report the event.
--DIAL 2: Call the Dial 2 phone number and report the event.

The CFR defines 20 different events which are grouped into 8 alarm groups. Each digit in 11111111 controls the actions for the alarm groups, starting with group 1. The default means all alarms groups are set to Dial 1.

For example, if you wanted the modem to call Dial 2 when the output shuts down due to no battery and/or a fault and send no alarm messages for self-test events, then set alarm groups 4 and 6 to Dial 2 and the alarm group 7 to none. This setting would be 11121201.
<table>
<tr><th>Alarm Group</th><th>Power Events</th></tr>
<tr><td>1</td><td>UPS000: UPS power up.</td></tr>
<tr><td>2</td><td>UPS001: Input out of tolerance.
UPS002: Input blackout.
UPS003: Inverter on.
UPS004: Line mode.</td></tr>
<tr><td>3</td><td>UPS005: Low battery warning.
UPS016: Battery OK.</td></tr>
<tr><td>4</td><td>UPS006: Low battery shutdown.</td></tr>
<tr><td>5</td><td>UPS007: Overload.
UPS008: Load OK.
UPS009: Temperature high.
UPS010: Temperature OK.</td></tr>
<tr><td>6</td><td>UPS011: Service required.
UPS012: UPS malfunction.</td></tr>
<tr><td>7</td><td>UPS013: Self test started (Inverter on).
UPS014: Self test passed (Line mode).
UPS015: Self test failed.</td></tr>
<tr><td>8</td><td>UPS017: Scheduled output shut down.
UPS018: Output shutdown.
UPS019: Output restored</td></tr>
</table>
</td></tr>
</table>

Figure 4.22
External Modem Setup Menu Items

4.7 Installing and Using the External Modem (Continued)

External Modem Menu Setup Menus (Continued)	
523 Set Inverter Alarm Delay	Setting this delays the transmission of "UPS003-Inverter on" messages for 1 to 5 minutes to prevent short interruptions in the line from being displayed. Setting it to 0 causes the immediate sending of the message. If the line returns and the CFR switches back to line mode before the delay time is over, then no "UPS004: Line mode" message is sent.
524 Set Dial 1 Phone Number	This sets the Dial 1 phone number. The string should start with ATDT and then the phone number. Refer to your modem manual for any further instructions.
525 Set Dial 2 Phone Number	This sets the Dial 2 phone number. The string should start with ATDT and then the phone number. Refer to your modem manual for any further instructions.
526 Set Location ID	This sets the location ID. It defines a location/name for every CFR so you know which unit is calling. This ID is included as the first line of any event message sent. The default value is "CFR UPS in RM 123" and the ID can be up to 20 characters long.
527 Set Custom Int cmd	This command initializes the modem. The CFR sends the string followed by an auto answer. The string can be up to 30 characters long and the default value is ATX4Q0V1&H0&R1&I0&B1.
528 Set Remote Hang up Time	This sets the time after which the CFR hangs up after it cannot connect to the host. This usually happens when the host is busy with another unit. The default value is 2 minutes but it can be set from 0 to 100 minutes. Setting it to 0 makes the CFR never hang up on a call.

Figure 4.22
External Modem Setup Menu Items (Continued)

Section 5
Maintenance

This section describes how to maintain the Alpha CFR 3000 and 3000RM UPS's:

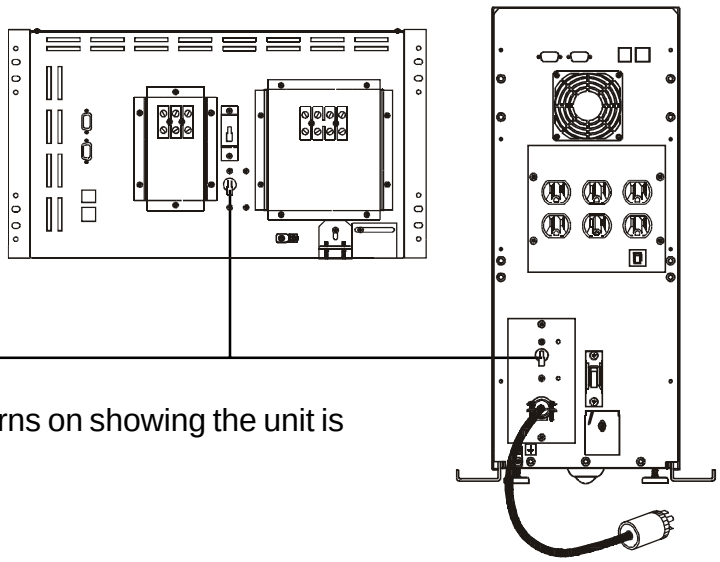
- **How to measure the battery back up time (Section 5.1).**
- **How to troubleshoot the unit (Section 5.2).**
- **How to return the unit to Alpha for repair (Section 5.3).**
- **How to replace the CFR 3000 tower mount's internal batteries (Section 5.4).**
- **How to change the unit's input and output voltages (Section 5.5).**
- **Specifications (Section 5.6).**

5.1 Testing the Battery Backup Time

This test measures how long the batteries can provide backup power by having them power the loads until they are discharged.

Tips:

- This test should be done once a year when the batteries are new. When the batteries are three years old or older, it should be done once every six months.
- This test should be done when new loads are connected to the unit.
- The unit should have been in Line Present mode for 24 hours before starting this test so the batteries are fully charged.
- Do a self test (Section 3.3) first. If it passes then do this test. If it doesn't find out why before proceeding.
- For reference, compare your measured time to the times listed in Section 5.6, "Battery Run Times." Because of various factors, your time may not match the times listed.



Procedure:

1. Switch off the Input circuit breaker.

   The display panel's Line Failure LED turns on showing the unit is operating on backup battery power.

   Record this start time.

2. The Low Battery Warning LED turns on.

   Record this time.

3. The run time is the time between 1 and 2.

4. Switch on the Input circuit breaker.

   The unit runs on line power and starts charging the batteries.

Battery Backup Time Test Finished

5.2 Troubleshooting

Most problems involve:

- Are the Input, Battery and Output circuit breakers switched on?
- Is the input voltage correct?
- Are the batteries expired?

If the unit fails to perform a specific function, Figure 5.1 lists typical symptoms, causes and solutions, starting with the most obvious and working systematically. If you cannot resolve a problem, contact Alpha's customer service department. The unit's electronics require no maintenance.

Battery Lifetime

The maintenance-free batteries can be affected by: operating temperature; number of discharges during the battery's life; charging characteristics and low voltage cutoffs. The unit complies with the battery manufacturer's specifications for optimum performance and the longest possible battery life.

In normal operation, the batteries may increase in capacity during the first three to twelve months. After the first 10 to 15 discharges, the available backup power may increase by up to 20%. Once at this peak they slowly loose capacity and eventually cannot provide backup power.

Symptom	Cause	Remedy
The batteries do not charge. The Low Battery Shutdown LED is on.	Faulty batteries.	Replace them.
	Faulty charger.	Contact Alpha.
No communication with RS-232 port.	Terminal emulation set up wrong.	With SID: 1200 baud, 8 data bits, no parity, 1 stop bit. With IID: See if Comm port parameters are correct. Adjust to match.
	Wrong RS-232 cable.	With SID: See if cable wiring correct (Section 2.6) With IID: Purchase custom cable from Alpha.
	RS-232 jumper not set correctly.	Contact Alpha Technologies.

Figure 5.1
Troubleshooting Table

Continued on the next page.

5.2 Troubleshooting (Continued)

Symptom	Cause	Remedy
No output. The Line Present and Line Failure LEDs are off or the Line Present is flashing.	Line power absent or out of tolerance and the batteries are not connected.	Check the input voltage. Check the battery connections.
	Input circuit breaker off. and Battery circuit breaker off.	Check to see both breakers are on.
No output. Line Present LED or Line Failure LED is on.	The output circuit breaker is off.	Turn it on.
Unit does not resume Line Present operation when line returns. Line Present LED and Line Failure LED both on.	Line voltage too high or low.	Wait for voltage to stabilize.
	Unit is in synchronization mode.	Wait about 1 minute.
Service LED on.	Various.	If SID is installed, perform troubleshooting (Section 3.4). If RS-232 is installed, look at the service codes. If IID is installed, look at the history logs and record all service codes. Contact Alpha for further assistance.
Incorrect output voltage. Line Present LED on, Line Failure LED off.	Incorrect setting of input/output voltage.	See Configuring the Input/Output Voltage (Section 5.5).
	Faulty control circuits.	Contact Alpha.
No output during line failure. Line Present LED off, Line Failure LED off, Low Battery and Low Battery Shutdown LEDs on.	Battery voltage low after a long power outage.	Wait for line power to return and recharge batteries.
	Faulty batteries.	Replace them.

Figure 5.1
Troubleshooting Table (Continued)

5.3 Returning the CFR to Alpha for Repairs

Before returning a unit for repair, obtain a Return Material Authorization (RMA) number from Alpha Technologies' customer service department. Clearly write it on the original shipping container.

If you do not have the container, pack the replacement with at least three inches of shock-absorbing material, but do not use popcorn type packaging. Returns should be prepaid and insured (COD and freight collect cannot be accepted).

NOTE: Alpha Technologies does not assume responsibility for damage caused by improper packaging of returned units.

To order parts or for technical information, contact Alpha Technologies customer service department directly at:

United States: (360) 647-2360
Canada: (604) 430-1476
United Kingdom: +44-1279-422110
Germany: +49-9122-79889-0
Middle East: +357-253-75675
Australia: +61-2-9722-3320

For emergency technical support 7 days a week / 24 hours a day call:

USA: 1–800–863–3364

CANADA: 1–800–667–8743

5.4 Replacing the Internal Batteries (CFR 3000 Only)

This procedure applies only to the tower version of the CFR (CFR 3000). The CFR 3000RM uses an external battery pack.

DANGER:

1) Read the battery safety precautions in the front part of this manual before proceeding. This procedure should only be done by trained and qualified personnel.

2) Do not short the battery terminals.

3) Make sure the cover does not touch the battery terminals or any internal parts when removing or replacing it.

5.4 Replacing the Internal Batteries (Continued)

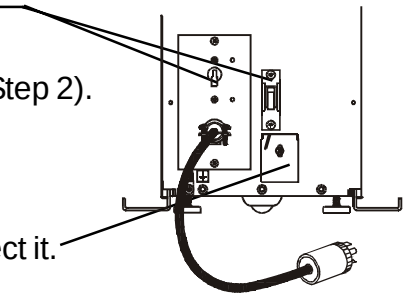
Tools and Materials Required:

- Phillips Screwdriver.
- $^{7}/_{16}$ and $^{3}/_{8}$ inch wrenches for the battery connectors.
- DC Voltmeter.

Step 1: Remove the Front Panel and the Cover

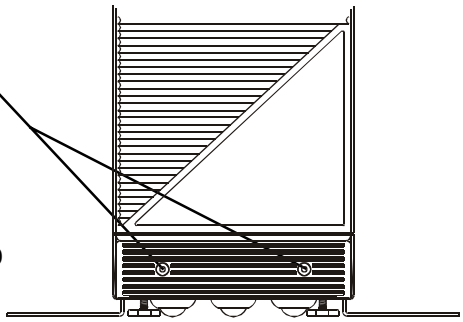
Procedure:

1. Switch off the Input and Battery circuit breakers.
2. Do not disconnect the unit from line power (See Step 2).
3. Disconnect all loads.
4. If an external battery pack is connected, disconnect it.



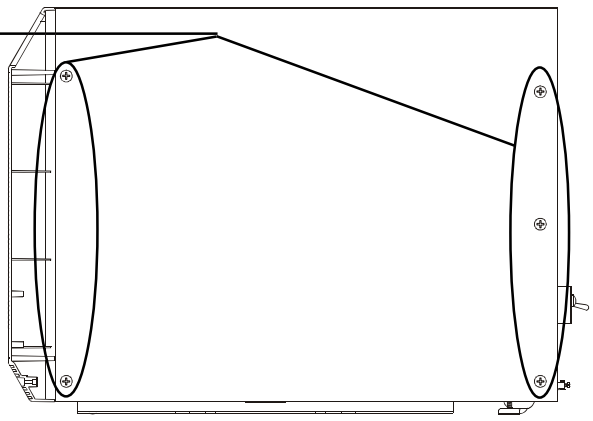
5. Loosen the two Phillips screws on the front panel.
6. Carefully pull the lower part of the front panel away from the unit and then lift it up and away.

TIP: The display panel is attached to this panel. Do not damage or disconnect the ribbon cable connecting it to the unit.



7. Unscrew the five screws on each side of the cover.
8. Lift the cover upward and away from the chassis.

DANGER: Make sure the cover does not touch the batteries or any internal components.



Panel and Cover Removal Finished

5.4 Replacing the Internal Batteries (Continued)

Step 2: Charger Voltage Test

This tests the unit's charger so the new batteries will not damaged by a faulty charger. Do this before removing the batteries.

Procedure:

1. Make sure:
   - The Battery circuit breaker is switched off.
   - The Input circuit breaker is switched on.
   - The utility line is connected.
2. Measure the DC voltage by:
   - Connecting the positive (+) to the top connector of the battery circuit breaker.
   - Connecting the negative (–) to the chassis (Figure 5.2).

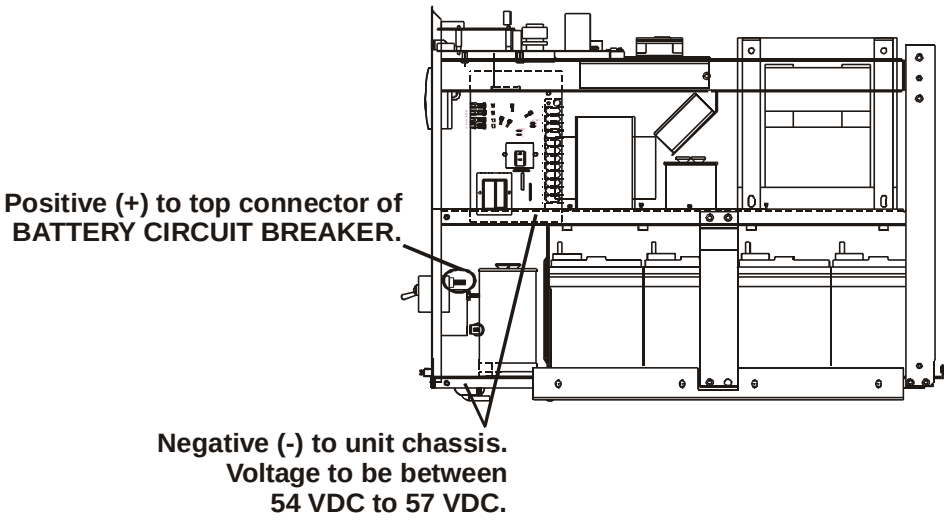


Figure 5.2
Charger Voltage Test

3. The voltage should be between 54 VDC to 57 VDC.
   - If it is, switch off the Input circuit breaker, disconnect the utility line and go to Step 3.
   - If it is not, the charger is faulty. Contact Alpha Technologies customer service department.

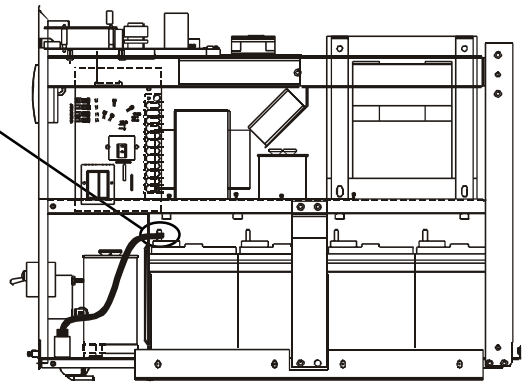
Charger Voltage Test Finished

5.4 Replacing the Internal Batteries (Continued)

Step 3: Battery Replacement

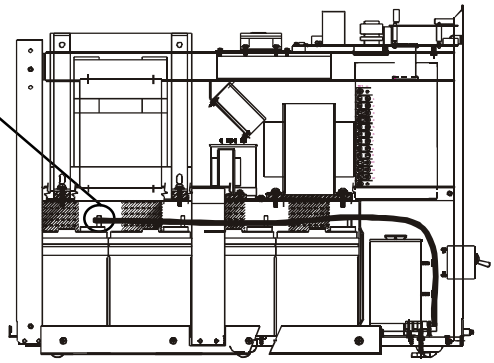
Procedure:

1. Disconnect the negative (black) battery lead from the rear battery.

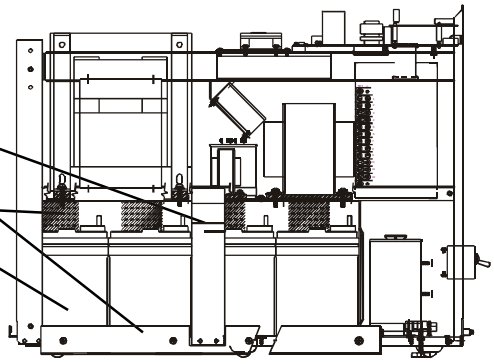


> **DANGER: Always** remove this negative lead first and connect it last.

2. Disconnect the positive (red) battery lead from the front battery.



3. Remove the top shelf support and, if attached, the seismic bracket.
4. Slide out the battery foam blocks and the batteries.
5. Disconnect the batteries from each other.



5.4 Replacing the Internal Batteries (Continued)

6. Place the new batteries in the unit. Pay close attention to the polarities while connecting them as shown in Figure 5.3. Do not attach the unit's negative or positive leads.

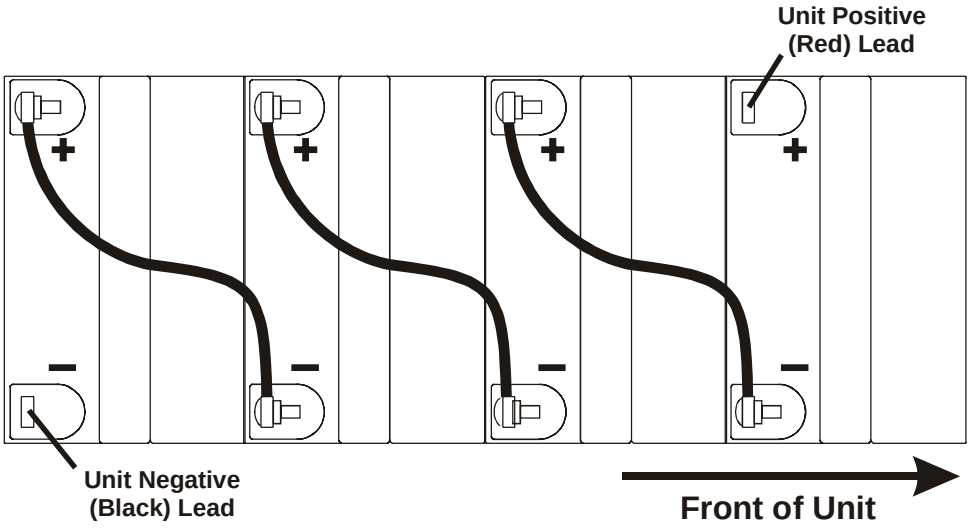


Figure 5.3
Battery Connection

7. Put the battery foam blocks on top of the batteries.

8. Attach the positive (red) battery lead to the front battery.

9. Attach the negative (black) battery lead to the rear battery.

10. Reattach the cover and the front panel.

11. Reconnect the utility line and the external battery (if used).

12. Start the unit (Section 3.1). Do a self test (Section 3.3).
    - If the unit passes the self test, turn it off (Section 3.2) and reconnect the load.
    - If it doesn't, check the battery connections or perform troubleshooting (Sections 3.4, 5.2).

13. Restart the unit.

Battery Replacement Finished

5.5 Configuring the Input/Output Voltage

The unit is factory configured to your input/output voltage specifications.

- Units configured only for 120 VAC input and output voltage need a new high voltage board installed before re-configuring the input or output voltage. Contact Alpha Technologies customer service department.
- Units configured for 230 VAC, 50 Hz input and output cannot be re-configured.
- Units configured for 208 VAC or 240 VAC input voltage can be re-configured to 208 VAC or 240 VAC input voltage.
- Units configured for 120/208 VAC output or 120/240 VAC output can be re-configured to 120/208 VAC or 120/240 VAC output.

DANGER: Lethal levels of voltages and currents are inside the unit when it is connected to line and battery power. The Input and Battery circuit breakers on the rear panel must be switched off before starting this procedure.

Tools and Materials Required:

- Phillips and Slotted Screwdrivers.

Procedure:

1. Turn off all loads. Make sure the Input and Battery circuit breakers on the rear panel are switched off.
2. For the CFR 3000, remove the front panel and the cover as described in Step 1 of Section 5.4. Find the high voltage board labeled as “700–226–XX” (Figure 5.4).

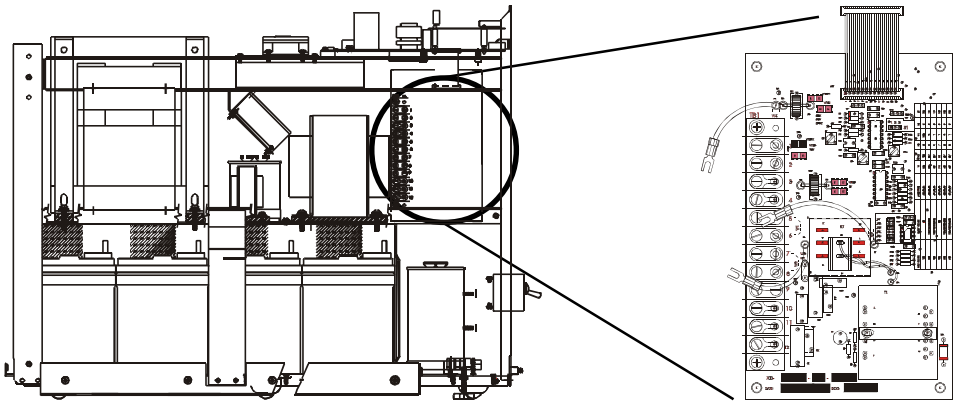


Figure 5.4
High Voltage Board in CFR 3000

5.5 Configuring the Input/Output Voltage (Continued)

3. For the CFR 3000RM, remove the front panel by unscrewing the 6 screws and lifting the panel away. Make sure you do not damage or disconnect the ribbon cable connecting the display panel to the unit. Find the high voltage board labeled as “700–226–XX” (Figure 5.5).

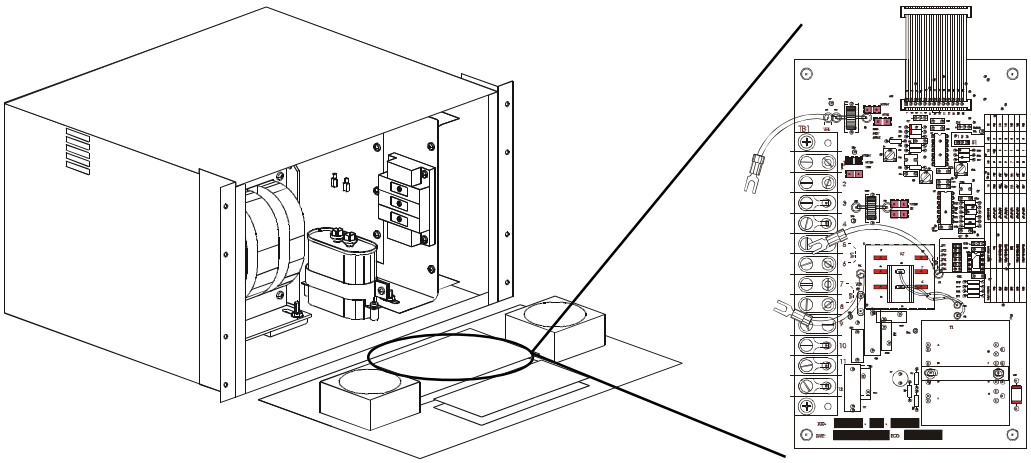


Figure 5.5
High Voltage Board in CFR 3000RM

4. On the high voltage board (Figure 5.6), reconfigure the wires and the jumpers as given in Figure 5.7.

5. Reattach the front panel and cover. Turn the unit on (Section 3.1)

TIP: You may want to measure the output voltage to make sure this procedure has been done correctly.

Voltage Reconfiguration Finished

5.5 Configuring the Input/Output Voltage (Continued)

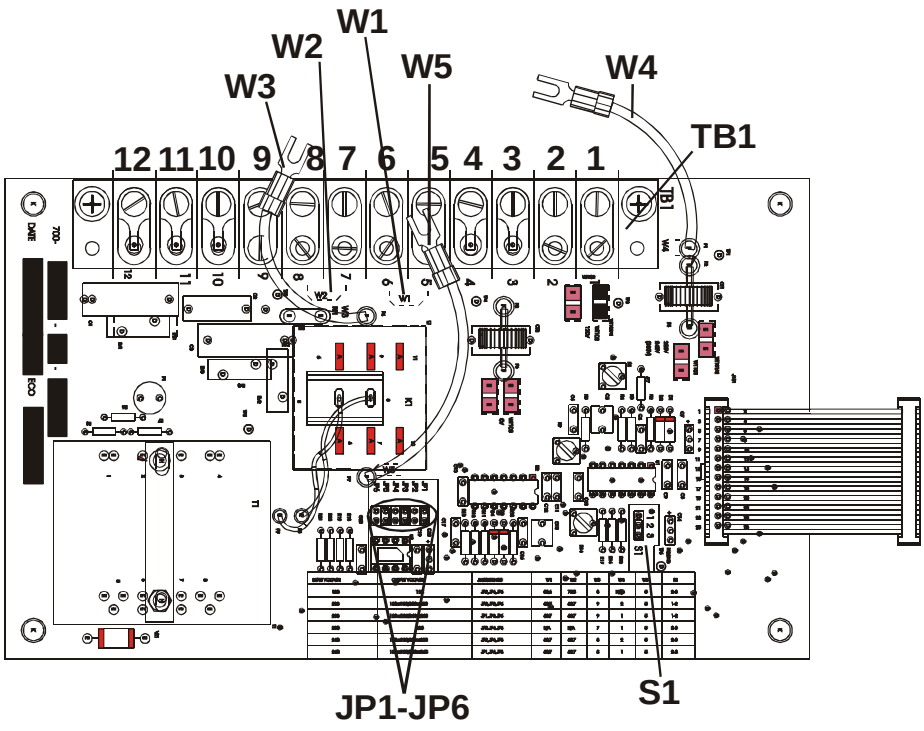


Figure 5.6
High Voltage Board

High Voltage Board Configuration								
Input Voltage	**Output** Voltage	**Jumper Settings**	**W1**	**W2**	**W3**	**W4**	**W5**	**S1**
120	120	JP2, JP4, JP6	5 & 6	7 & 8	8	------	5	2-3
208	120/208	JP2, JP3, JP6	6 & 7	6 & 7	9	2	5	1-2
208	120/240	JP1, JP3, JP6	6 & 7	6 & 7	9	1	5	1-2
230	230	JP2, JP4, JP6	--------	--------	7	1	5	2-3
240	120/208	JP2, JP4, JP5	6 & 7	6 & 7	8	2	5	2-3
240	120/240	JP1, JP4, JP5	6 & 7	6 & 7	8	1	5	2-3
120	120/208	JP2, JP4, JP6	5 & 6	7 & 8	8	2	5	2-3
120	120/240	JP1, JP4, JP6	5 & 6	7 & 8	8	1	5	2-3

Figure 5.7
High Voltage Board Configurations

5.6 Battery Run Times

The times in these charts are to be used in conjunction with the battery run time you measured in Section 5.1, “Measuring the Battery Run Time.”

Tips:

- Your run time can be different than shown in the charts. Battery run time is affected by temperature, battery age and condition and the size and type of the loads. Actual results can vary by ± 15%.
- End of battery life is defined when the battery capacity falls below 80% of rated capacity.
- Times shown are averaged over a batch.
- All battery voltages are 48VDC.
- Times listed as 12:00 show the run time is 12 hours or more.

Tower Models (CFR 3000) All times in Hours:Minutes

% Load	Output (W)	Output (VA)	Internal Battery Only	+ 1 EBP-48A	+ 1 EBP-48E	+ 2 EBP-48E	+ 3 EBP-48E	+ 4 EBP-48E	+ 5 EBP-48E	+ 6 EBP-48E	+ 7 EBP-48E
10	200	300	2:44	7:56	11:55	--------	--------	--------	--------	--------	--------
20	400	600	1:42	4:51	7:58	--------	--------	--------	--------	--------	--------
30	600	900	1:11	3:20	5:51	10:50	--------	--------	--------	--------	--------
40	800	1200	0:54	2:28	4:31	8:30	--------	--------	--------	--------	--------
50	1000	1500	0:42	1:55	3.37	6:54	10:18	--------	--------	--------	--------
60	1200	1800	0:34	1:33	2:59	5:44	8:39	11:34	--------	--------	--------
70	1400	2100	0:29	1:17	2:32	4:54	7:23	9:58	--------	--------	--------
78	1550	2325	0:25	1:08	2:15	4:23	6:38	8:57	11:17	10:53	--------
85	1700	2550	0:22	1:00	2:01	3:57	6:00	8:07	10:17	9:36	11:17
93	1850	2775	0:20	0:54	1:50	3:35	5:27	7:24	9:21	8:32	10:02
100	2000	3000	0:18	0:49	1:40	3:16	4:59	6:47	10:27	7:39	8:59

5.6 Battery Run Times (Continued)

Rack Mount Models (CFR 3000RM) with EBP 417-48 RM Battery Packs
All times in Hours:Minutes

% Load	Output (W)	Output (VA)	1 Pack	2 Packs	3 Packs	4 Packs	5 Packs	6 Packs	7 Packs	8 Packs	9 Packs	10 Packs
10	200	300	0:49	2:00	3:20	4:44	6:10	7:35	8:57	10:16	11:35	12:00
20	400	600	0:32	1:19	2:13	3:12	4:13	5:15	6:18	7:19	8:19	9:18
30	600	900	0:23	0:58	1:38	2:21	3:07	3:54	4:44	5:32	6:20	7:08
40	800	1200	0:17	0:45	1:16	1:49	2:25	3:03	3:41	4:21	5:01	5:41
50	1000	1500	0:13	0:36	1:01	1:28	1:57	2:28	2:59	3:32	4:05	4:39
60	1200	1800	0:11	0:29	0:50	1:13	1:37	2:03	2:29	2:57	3:25	3:53
70	1400	2100	0:08	0:25	0:42	1:02	1:22	1:44	2:07	2:30	2:54	3:18
78	1550	2325	0:07	0:22	0:38	0:55	1:13	1:33	1:53	2:14	2:36	2:58
85	1700	2550	0:06	0:19	0:34	0:50	1:06	1:24	1:42	2:01	2:20	2:40
93	1850	2775	0:05	0:17	0:31	0:45	1:00	1:16	1:32	1:49	2:07	2:25
100	2000	3000	0:04	0:16	0:28	0:41	0:55	1:09	1:24	1:40	1:56	2:13

Rack Mount Models (CFR 3000RM) with EBP 48A RM Battery Packs
All times in Hours:Minutes

% Load	Output (W)	Output (VA)	1 Pack	2 Packs	3 Packs	4 Packs	5 Packs	6 Packs	7 Packs	8 Packs	9 Packs	10 Packs
10	200	300	2:44	7:56	------	------	------	------	------	------	------	------
20	400	600	1:42	4:51	9:03	------	------	------	------	------	------	------
30	600	900	1:11	3:20	6:12	9:39	------	------	------	------	------	------
40	800	1200	0:54	2:28	4:34	7:06	10:01	------	------	------	------	------
50	1000	1500	0:42	1:55	3:332	5:29	7:44	10:13	------	------	------	------
60	1200	1800	0:34	1:33	2:49	4:23	6:10	8:10	10:21	------	------	------
70	1400	2100	0:29	1:17	2:19	3:35	5:03	6:41	8:29	10:25	------	------
78	1550	2325	0:25	1:08	2:02	3:08	4:25	5:50	7:24	9:06	10:53	------
85	1700	2550	0:22	1:00	1:48	2:46	3:53	5:09	6:32	8:01	9:36	11:17
93	1850	2775	0:20	0:54	1:37	2:28	3:28	4:34	5:48	7:07	8:32	10:02
100	2000	3000	0:18	0:49	1:27	2:13	3:06	4:06	5:11	6:23	7:39	8:39

5.7 Specifications

Common Specifications	
Input Frequency (Hz)	50 ± 3 60 ± 3
Input Voltage Variation	-20% to +10% VAC
Output Frequency (Hz) Inverter mode	± 0.1 Hz
Output Regulation (VAC)	± 1%
Efficiency (Typical Load)	90%
Total Harmonic Distortion	<5%
Output Waveform	Sine
Step Load Response	<10% @ 100% load
Noise Attenuation	Common mode: -120dB (100KHz to 1 MHZ) Normal Mode: -60dB (100 KHz to 1 MHz)
Operating Temperature	32°-104°F (0°-40°C)
Heat Output	785BTU/h, 230W
Audible Noise @ 1m	3000: <45 dBA 3000RM: <60 dBA
Battery Specifications	
Recommended type	Valve regulated, maintenance free.
Voltage (VDC)	48
Low Voltage Cutout (VDC)	42
Charger Type	Linear (3 Amps Max)
Charger Voltage (VDC)	55.2 at 25°C
Communications	
Indicators	Line Present, Line Failure, Low Battery Warning, Low Battery Shutdown, Test, Service.
Controls	Alarm off, Manual Start (Test)
Connectors	External Alarm (RJ-45) RS-232 (DB-9), External IID (RJ-11).
Audible Alarms	Line Failure, Low Battery Warning, Service needed
Output Alarms	Rear panel RJ-45 connector with Form C contacts for Line Present/Line Failure and Battery OK/Low Battery Warning.

NOTES:

1) Specifications subject to change without notice.

2) These specifications are based upon use with computer-type loads with a crest factor of 3:1 (Max) and a typical power factor of 0.67.

Mechanical Specifications	3000	3000RM
Dimensions W x H x D, in (mm)	8.5 x 21.3 x 30.0 (216 x 541 x 762)	17 x 10.5 x 15 (432 x 267 x 381)
Weight, lbs (kg) 60 Hz 50 Hz	 283 (128) 288 (131)	 130 (59) 135 (61)
Electrical Specifications		
60 Hz Models		
Output Power (VA)	3000	
Active Power (W)	2000	
Input Voltage (VAC)	120/208/240	
Maximum Input Current (Amps)	21/12/11	
Output Voltage (VAC)	120/208/240	
Maximum Output Current (Amps)	25/14.4/12.5	
50 Hz Models		
Output Power (VA)	3000	
Active Power (W)	2000	
Input Voltage (VAC)	230	
Maximum Input Current (Amps)	11	
Output Voltage (VAC)	230	
Maximum Output Current (Amps)	13	
Circuit Breaker Ratings		
Input 120 VAC 208/230/240 VAC	 25 Amps 15 Amps	
Battery	100 Amps	
Compliance To		
60 Hz	CSA Std. C22.2 No 107.1-M91, UL 1778	
60 Hz Medical	Per 60 Hz plus: CSA C22.2 No 601.1-M90, UL Std No 60601-1 (2nd Ed)	
50 Hz	EN 50091-1, EN60950, IEC 950, IEC 146-4	
50 Hz Medical	Per 50 Hz plus: CSA C22.2 No 601.1-M90, UL Std No 60601-1 (2nd Ed)	
Marks	60 Hz: $_{C}$CSA$_{US}$, 50 Hz: CE	

120 VAC Output

Connecting Loads To 23–25

3000

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LIMITED 24-MONTH WARRANTY
AC PRODUCTS

Alpha Technologies warrants its equipment to be free of manufacturing defects in material and workmanship for a period of 24 months from the date of manufacture. The liability of Alpha Technologies under this warranty is solely limited to repairing, replacing, or issuing credit for such equipment (at the discretion of Alpha Technologies), provided that:

1. Alpha Technologies' Customer Service Department is promptly notified, by facsimile or telephone, that a failure or defect has occurred.

2. Alpha Technologies' Customer Service Department issues a Return Materials Authorization (RMA) number, and designates the service location. The RMA must be clearly marked on the outside of the shipping container.

3. Purchaser is responsible for all in-bound shipping and handling charges (COD and freight collect will not be accepted without prior approval from Alpha Technologies); Alpha Technologies will pay out-bound surface shipping charges for return of repaired equipment.

4. A satisfactory examination of the returned unit by Alpha Technologies' Service personnel shall disclose that defects have not been caused by misuse, neglect, improper installation, repair, alteration, or accident, or failure to follow instructions furnished by Alpha Technologies. If Alpha Technologies' Service personnel determine that the unit has been damaged due to one of these causes, or if the unit is free of defects, a handling or repair fee may be assessed prior to returning the unit.

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This limited 24-month warranty does not extend to any unit that has been repaired or altered by any party other than Alpha Technologies or its Authorized Service Center.

Alpha Technologies reserves the right to discontinue particular models and to make modifications in design and/or function at any time, without notice and without incurring obligations to modify previously purchased units.

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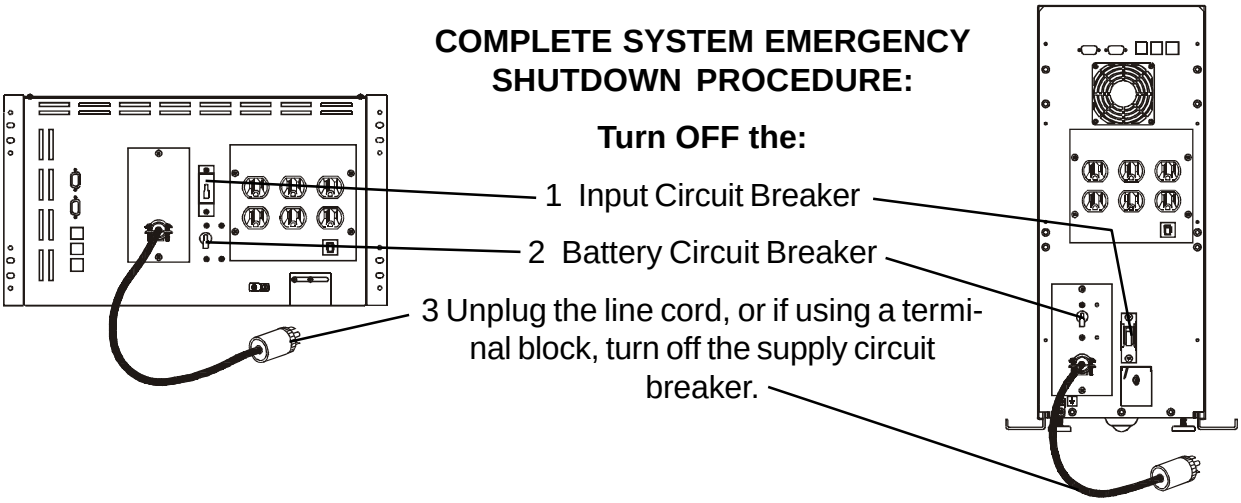
Emergency Shutdown Procedure

The unit has more than one live circuit. During an emergency, line power may be disconnected at the unit's input but power can still be present at the output.



COMPLETE SYSTEM EMERGENCY SHUTDOWN PROCEDURE:

Turn OFF the:

1 Input Circuit Breaker

2 Battery Circuit Breaker

3 Unplug the line cord, or if using a terminal block, turn off the supply circuit breaker.

ALTERNATE PROCEDURE (IF EPO SWITCH IS INSTALLED):

1 Press down the Emergency Power Off Switch for 3–5 seconds.

2 Disconnect the AC Input and External Battery Pack(s).

For emergency technical support 7 days a week / 24 hours a day call:

USA: 1–800–863–3364

CANADA: 1–800–667–8743

To order parts or for technical information, contact Alpha Technologies customer service department directly at:

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